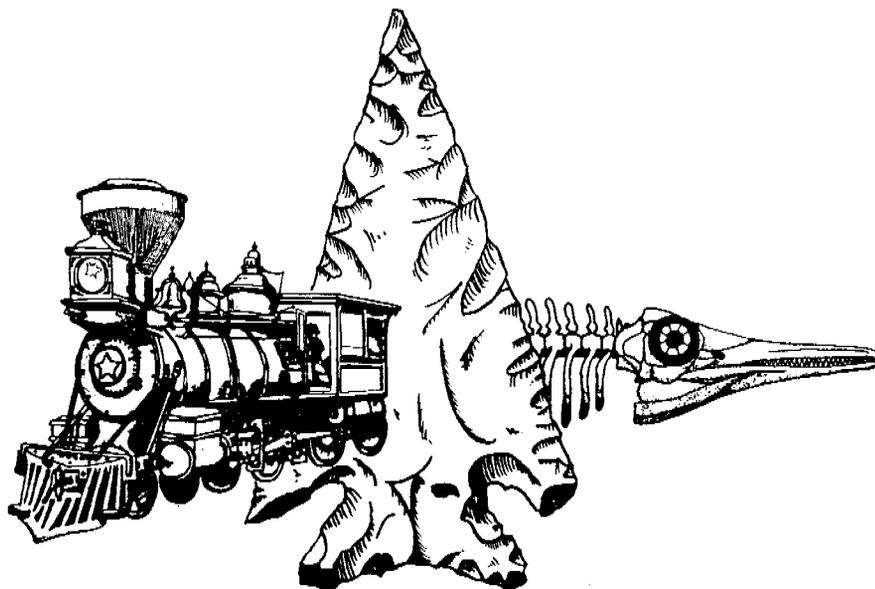


BUREAU OF LAND MANAGEMENT
NEVADA

CONTRIBUTIONS TO THE STUDY OF CULTURAL RESOURCES



**CULTURAL RESOURCES OVERVIEW
OF THE LAS VEGAS VALLEY**

Kevin A. Rafferty

TECHNICAL REPORT No. 13

RENO, NEVADA



1984

BUREAU OF LAND MANAGEMENT
NEVADA

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- *No. 14 The Lake Range Quarry, Washoe County, Nevada. Kathryn E. Pedrick (1985). 29 pp.

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CULTURAL RESOURCES OVERVIEW OF THE
OF THE LAS VEGAS VALLEY

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June 1985

FOREWARD

This volume, "Cultural Resources Overview of the Las Vegas Valley," was originally written by Kevin A. Rafferty in 1983 while he was employed as Archeologist for the Stateline Resource Area of the Las Vegas District, Bureau of Land Management. Subsequently, Rafferty left the Bureau to assume his present position with the Environmental Research Center, Division of Anthropological Studies, at the University of Nevada, Las Vegas. Other program priorities delayed the editing and final production of this volume until now. I am pleased that it has finally been included in the Contributions to the Study of Cultural Resources Series as Technical Report No. 13. Its release would have been further delayed had it not been for the typing effort of Julie Tremblay of the Stateline Resource Area.

Rafferty has taken the scope of this overview beyond the limits generally associated with syntheses of existing data in that he addresses issues related to the management of cultural resources in the Las Vegas Valley. Although the opinions and recommendations are those of the author and may not be fully implemented by the Bureau, they provide a sound basis for the formulation of program goals and objectives. It is in this regard that Rafferty's work is most valuable.

As a final note, the reader may be interested to learn that since leaving the Bureau, Rafferty has maintained his commitment to the cultural resources of the Las Vegas Valley. "On Common Ground: Las Vegas as a Cultural Frontier in Prehistory," written by Rafferty for the Nevada Division of Historic Preservation in 1984, documents the preliminary results of an ongoing project involving the identification of cultural resources on private lands in the Las Vegas Valley. The enthusiasm that Rafferty has injected into the pages of this overview remains undaunted.

Thomas F. Zale
Stateline Resource Area
Las Vegas

June, 1985

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INTRODUCTION

Since the early 1970s, the Bureau of Land Management has been involved in what has come to be known as "cultural resource management", which is "the development and maintenance of programs designed to protect, preserve and/or scientifically study cultural resources... and the natural resource that figures scientifically in cultural systems" (USDI, Bureau of Land Management, Nevada State Office Information Memorandum No. NSO 76-59:3). This involves the survey of lands subject to impact through Bureau initiated or sponsored projects, the identification and recording of sites, and the development of mitigative measures to avoid or minimize the impacts of land altering activities on archeological sites.

Administratively, activities under Bureau purview may be distinguished in three categories; (1) awarding contracts to private companies or universities to conduct project specific or site specific research; (2) granting antiquities permits to qualified individuals, private companies and universities to conduct research on public lands; and (3) conducting direct Bureau research and survey by District and Resource Area Archeologists and/or District Archeological Technicians (DATs). Most work is on a project specific basis, dealing with small areas or individual sites, although there are exceptions (Bergin et al. 1980; Crownover 1981; and Hauck et al. 1979 are examples from the Las Vegas District).

Theoretically, contract work should meet or satisfy at least three obligations (MacLeod 1975; Raab and Klinger 1977); (1) the research must provide a maximum return of new information relevant to archeological goals; (2) the agency which sponsors the research must be provided with information relevant to needs and goals; and (3) the research must provide a balance between archeological goals, the goals of the sponsoring agency, and the public interest in such a way that maximum benefit accrues to the discipline and to the public. It has been suggested (Binford 1964; Lipe 1974; Judge, Ebert, and Hitchcock 1975) that the best method of reaching these goals is the development of regional research designs. These general guides can help direct the course of work undertaken in a particular area in order to answer questions germane to the larger archeological picture of a region. Although these writers were referring to academic or classic archeological research, this is a standard that the Bureau of Land Management should also try to emulate. All too often, Bureau archeological work remains project specific, germane only to the identification of impacts to cultural resources and to suggestions as to ways to mitigate these impacts. Little effort is made to integrate this data into a larger regional picture because of the small size of the projects being undertaken and the lack of existing regional research designs to relate to.

This disjunctive approach does not have to be so, as testified to by work conducted elsewhere; the State of South Carolina has established a regional research design for highway salvage work (Goodyear 1975). Attempts have been made in other states to integrate small projects into the framework of a regional research design (Gumerman 1973). In Nevada

this has been attempted on a small scale. Henderson (1978) attempted such a study in the Ely District and two studies by Rafferty (1981a, 1982a) under the auspices of the Santini-Burton Land Sale Act (P.L. 95-586) have attempted a similar approach. A Class I Overview that synthesizes prehistoric, historic, and ethnographic data by BLM District (Bowers and Muessig 1982; Bard et al. 1981; Hauck et al. 1979; Pendleton et al. 1982; Welch 1981) is the first step in creating a research design, but covers too large an area to be such a design. It is not intended to perform this function since it is a management document designed to "facilitate identification, evaluation, and protection of prehistoric and historic cultural resources within BLM jurisdiction" (Pendleton et al. 1982:1). However, an overview can provide an excellent starting point for the formation of a research design.

This paper is an attempt to review the existing data for the Las Vegas Valley and suggest a set of research questions and orientations to guide work in the subject area. An existing Class I Overview for Clark County (Hauck et al. 1979) covers much of the data included in this document in a general manner. The current document focuses on a much smaller geographic area than the Las Vegas District or Clark County and introduces data in much greater detail. Numerous small projects have been undertaken in the Las Vegas Valley by the Las Vegas District, Bureau of Land Management (BLM); the University of Nevada, Las Vegas (UNLV); and the Nevada Department of Transportation. Several larger projects have also been undertaken by all three agencies, defined as projects larger than 320 acres. The author has conducted at least five large projects in the last three years, three of which were related to the Santini-Burton Land Sale Act (Rafferty 1981a, 1982a, 1983a). None of the small projects were reviewed by the Class I Overview and most of the larger projects were conducted since the Class I was written. This paper attempts to synthesize the results of these projects within a regional framework.

Besides providing a data synthesis, this work has several other goals. The first is an attempt to delineate cultural resource sensitivity zones within the valley, thus allowing decisions concerning the scope and intensity of project-related surveys and mitigative efforts to be made. If project areas in low-sensitivity zones can be sampled employing key environmental or other variables rather than being intensively surveyed, the BLM can then direct the limited resources of public and private funds and manpower to archeologically sensitive areas. Once such zones are identified their utility can be tested archeologically. The 1983 Santini-Burton Land Sale survey, described in Appendix I, will serve as a minor test of the utility of such sensitivity zones.

Another goal of this overview is to suggest specific research questions that work in the valley can focus on; questions that need to be answered before the cultural resources of the Las Vegas Valley are completely destroyed by urban development.

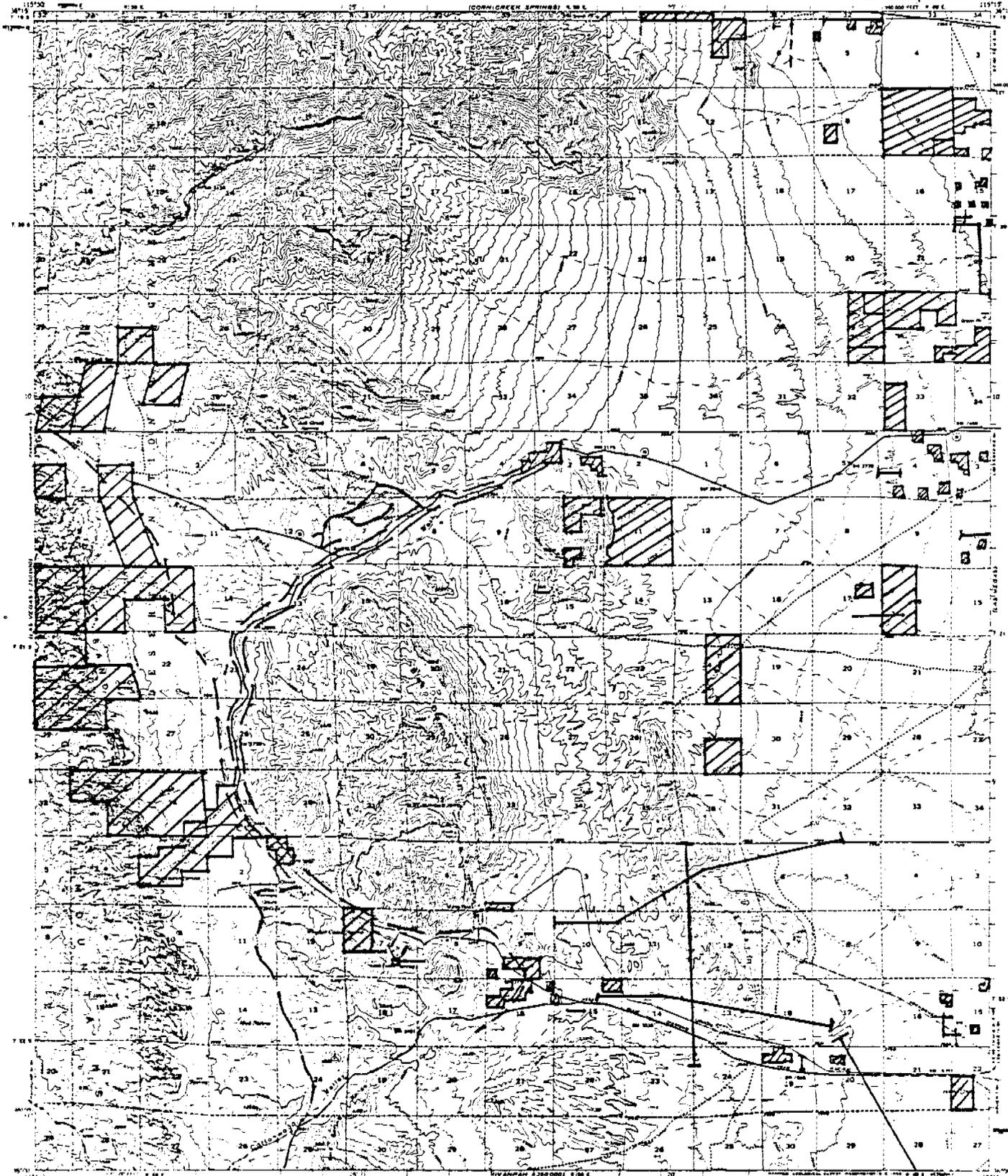
Finally, suggestions for the management of Bureau administered lands in the Las Vegas Valley will be offered in order that data and sites be examined at the most appropriate level of detail prior to their destruction by development. Recommendations for the preservation of archeological sites on private land, or for their mitigation, will also be offered. It is hoped that this effort will help encourage the preservation, examination, and mitigation of the archeological resources in the Las Vegas Valley in order that basic questions concerning the regional prehistory can be asked and hopefully answered.

PROJECT AREA AND SCOPE

The Las Vegas Valley can be defined in a variety of different ways; as the boundaries of the City of Las Vegas, by hydrological or physiographic criteria, or by a variety of other means. For the purpose of this work, the Las Vegas Valley is defined by the arbitrary boundaries of five United States Geological Survey (USGS) 15 minute series maps; the Blue Diamond, Corn Creek Springs, Gass Peak, Las Vegas, and Henderson Quadrangles (Figures 1-5). This area includes roughly 1,227 square miles or 785,280 acres of land and is located in central Clark County within the Stateline Resource Area of the Las Vegas District, BLM. The study boundaries include the City of Las Vegas (ca. 100 square miles), Clark County owned lands, and the City of Henderson. Some lands in the western portion of the valley are owned by the Summa Corporation. By and large, however, the BLM is the major land-controlling entity in the Las Vegas Valley administering large tracts of land north, east, and west of the city proper, as well as numerous parcels of land within the city boundaries. The BLM is in the process of selling selected tracts of land in the urban Las Vegas area under the auspices of the Santini-Burton Land Sale Act (P.L. 95-586) and other ongoing sales programs, (i.e. the Recreation and Public Purposes Act). In 1981 and 1982, the BLM (Rafferty 1981a, 1982a) conducted cultural resources surveys immediately west of the Las Vegas city limits under P.L. 95-586, totaling over 1,400 acres of land. In 1983, another P.L. 95-586 survey was conducted involving over 600 acres (Rafferty 1983a). Numerous R&PP projects are being studied, the largest being an expansion of Floyd Lamb State Park under the "good neighbor policy" involving 1,360 acres of land.

The following methodology was adopted for this overview. The BLM maintains extensive site and survey records for the Las Vegas Valley area. All sites are numbered with both a Smithsonian trinomial system number (26 CK X) and a BLM cultural resource number (NV-05-X). All project-related survey reports are also ordered numerically such as 5-1000(P). The letter in parentheses denotes whether the survey results were positive (P) or negative (N). All sites and surveyed areas are recorded and plotted onto the appropriate 7.5 minute and 15 minute USGS topographic maps. These maps provided the data base for this study.

The Museum of Natural History at UNLV also maintains extensive site and report files. Many are duplicates of the BLM files, but further investigation by the author revealed several site sheets and a number of reports prepared by both professional and student archeologists at UNLV that



MISSING 22ND AND 23RD SPACES TO THE SURVEY
COURTESY OF THE U.S. GEOLOGICAL SURVEY
1978

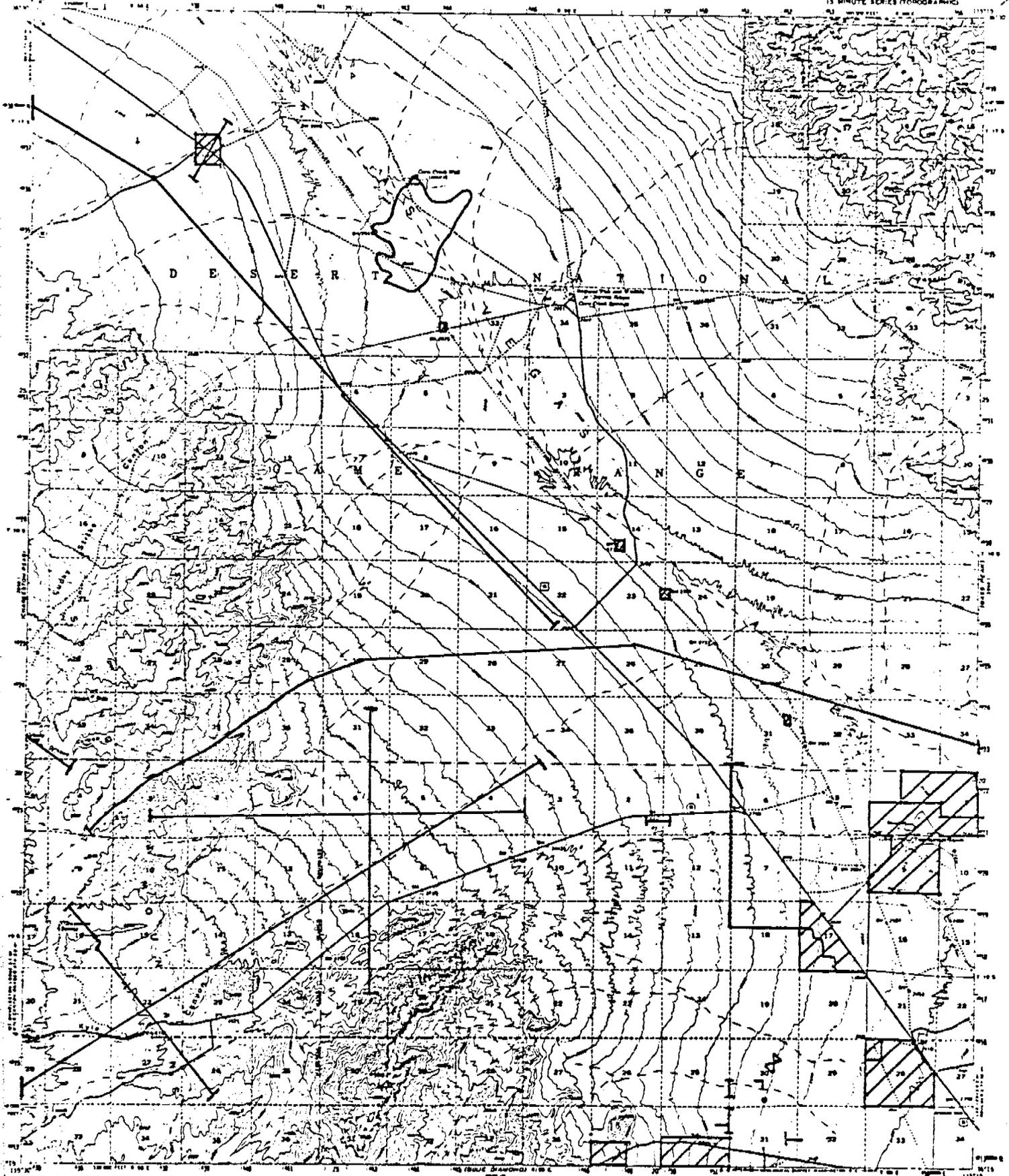
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DOTTED LINES W/NEARBY MAP INDICATE

ROAD CLASSIFICATION
UNIMPROVED ROAD
IMPROVED ROAD
RAILROAD
0.5 Miles
1 Mile

BLUE DIAMOND NEV
WYOMING-CLARK CO
1978

FOR SALE BY U.S. GEOLOGICAL SURVEY, FEDERAL CENTER, DENVER, COLORADO OR WASHINGTON 25, D. C.
A POLAR PROJECTION CYLINDRICAL MAP WITH MERIDIAN SPACING OF 15 MINUTES

FIGURE 1- SURVEYED PARCELS, BLUE DIAMOND 15' USGS MAP



Map and aerial photographs by the Geological Survey
Control by USGS and USGAS
Photographs from aerial photographs by the Geological Survey
Aerial photographs taken 1952. Contour interval 100 feet
Photometric correction 1977 using differential method
ICONS for grid based on Nevada coordinate system, zone 12
Control line less than 1000 feet in length
1000-foot Universal Transverse Mercator grid, zone 12, datum of 1983
Control line less than 1000 feet in length
ICONS for grid



SCALE 1:62500
CONTOUR INTERVAL 80 FEET
SPRINKLE LINE, CENTER OF HALF SECTION, CENTER
SECTION 16, T42N, R10E, S12E

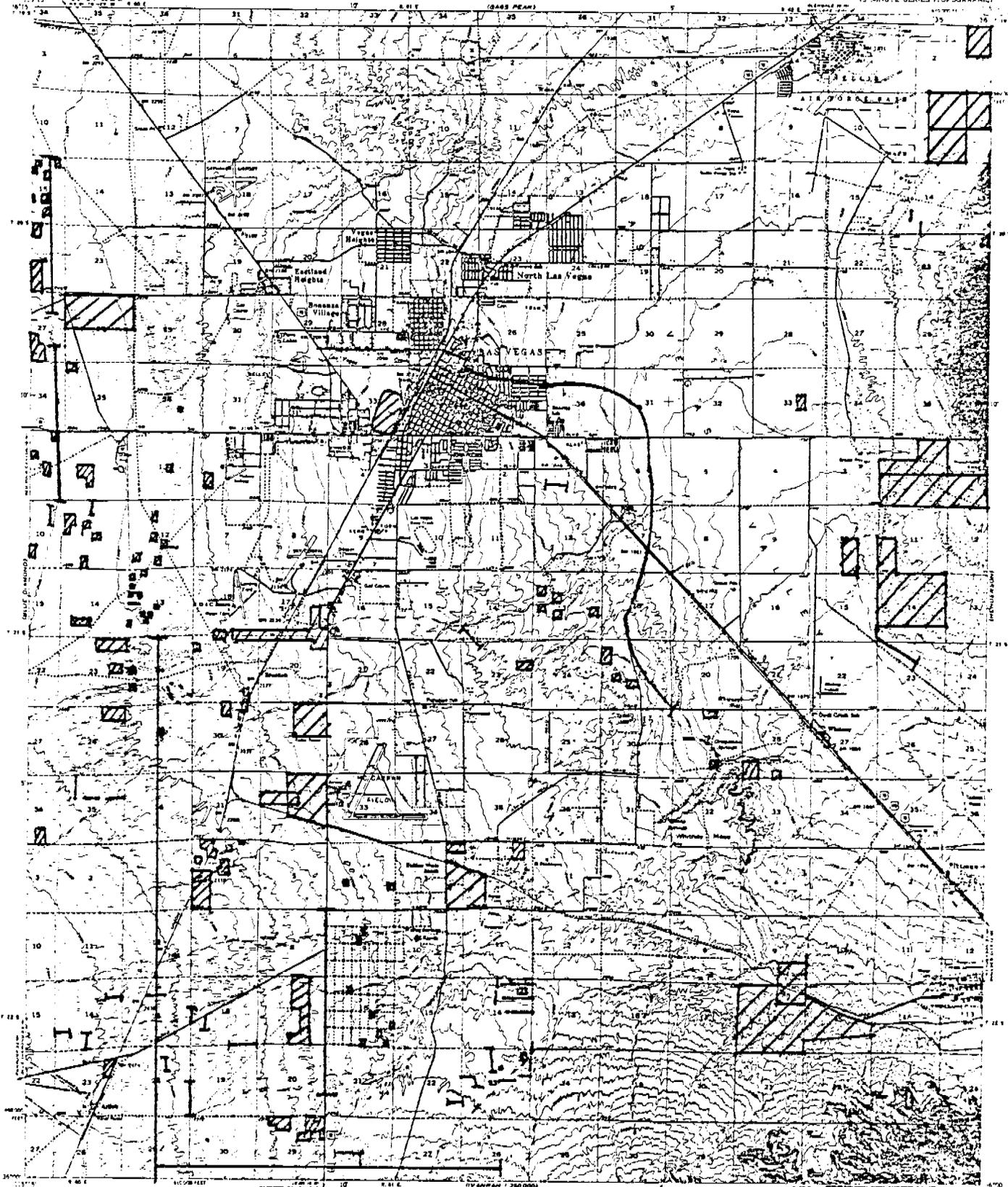


ROAD CLASSIFICATION
Main Road ———— Light Road - - - - -
Unimproved Road - - - - - Unimproved Rd
U.S. Road ———— State Road ————

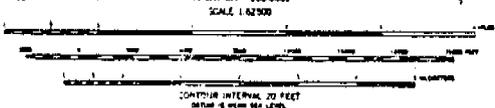
CORN CREEK SPRINGS, NEV.
8113 81131515
1982
AND 750 17 - SERIES 1700

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FIGURE 2- SURVEYED PARCELS, CORN CREEK SPRINGS 15' USGS MAP



Revised, edited and published by the Geological Survey
Contract by USGS and USFS BGS
Topography from air photo mosaics by Eastman Kodak
and the 20-foot contour lines by the U.S. Army Corps of Engineers
Photographic control by the U.S. Army Corps of Engineers
1:50,000 and 1:25,000 scale maps available from the
U.S. Geological Survey, Washington, D.C. 20508
Other maps and publications available from the
U.S. Geological Survey, Washington, D.C. 20508



ROAD CLASSIFICATION
 Highway 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100
 U.S. Road U.S. Route

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LAS VEGAS, NEV
1:62,500-11524/15

FIGURE 4- SURVEYED PARCELS, LAS VEGAS 15' USGS MAP

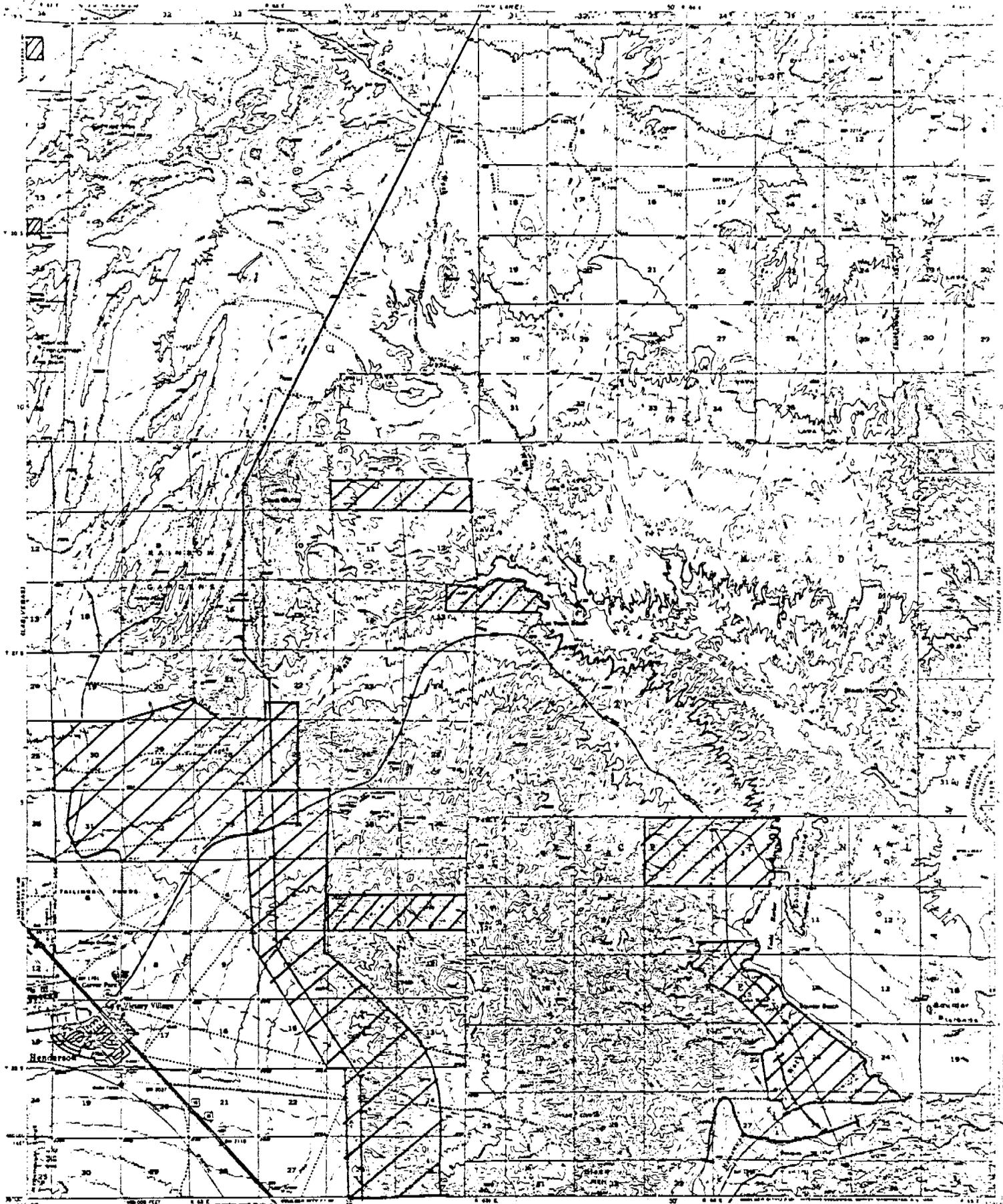


FIGURE 5- SURVEYED PARCELS, HENDERSON 15' USGS MAP

were not contained within the Las Vegas District files. These were secured, numbered, and entered into the BLM records system and plotted on the appropriate maps.

Finally, a search of the literature was conducted to identify data not included in the files. Periodicals and series consulted included the Nevada State Museum Anthropological Series, the Masterkey, the Desert Research Institute Publications in the Social Sciences, the University of Utah Anthropological Papers, the Nevada Archaeologist, the Nevada Archaeological Survey Reporter and Research Papers, the University of California Publications in American Archaeology and Ethnology, and the University of California Anthropological papers. Also consulted were BLM papers and manuscripts, the Class I Overview of Clark County (Hauck et al. 1979), Clark County planning documents, and locally available documents including Master's theses from UNLV.

Many of the ideas and concepts contained herein resulted from discussions with various colleagues. Mary Rusco of the Nevada State Museum, and various individuals at UNLV--Margaret Lyneis, Richard Brooks, Lynda Blair, and Robert Ellis, among others--contributed their ideas concerning this data base.

This project essentially relies on existing information although the writer is familiar with many of the sites in the region. Little fieldwork was conducted to check the accuracy of older site sheets in terms of completeness of data, location, and even their continued existence. Although potential inaccuracies may affect some of the precise details of this study, the broad general outlines are essentially accurate. This study offers a very thorough inventory and discussion of the Las Vegas Valley, a badly neglected archeological region.

ENVIRONMENTAL SETTING

Climate

The Las Vegas Valley lies within the Mojave Desert and the climate is typical of this desert biome. Summers are hot and dry with annual low temperatures averaging 60°F and the highs in the 115 to 120°F range. Winters are mild with lows averaging 25°F and highs approaching 70°F.

There are approximately 230 frost free days per year in the valley (USDI, BLM, 1980:3). This would provide a more than adequate growing season in the valley for the traditional Native American agricultural triad of maize, beans, and squash.

Precipitation is tempered by elevation and location. Las Vegas is in the rain shadow of the Sierra Nevada Mountains causing semi-arid to arid conditions to prevail in the study area. Las Vegas's mean annual precipitation at 2,165 feet is 4.7 inches. Little Red Rock, at 3,800 feet, averages roughly seven inches while areas above 7,000 feet in the nearby Spring Mountains have a mean annual precipitation of 12 inches. Rainfall occurs in a biseasonal mode, winter (January-February) and summer (July-August-September), with the summer storms being intense and of short

duration (USDI, BLM 1979:3; 1980:19). There is significant year-to-year variation in the rainfall patterns. January rainfall in Little Red Rock varied from a trace in 1968 to 5.67 inches in 1969 (NOAA, 1968:1069). Variation such as this would have had a significant effect on the yearly availability of wild floral and faunal resources exploited by the aboriginal inhabitants of the region.

Topography and Geology

The following discussion is adapted from Langan, Larson, and George (1957), Maxey and Jameson (1948), and the Red Rock Canyon Recreation Lands Oil and Gas Environmental Assessment (USDI, BLM 1980).

The Las Vegas Valley is within the Basin and Range physiographic province, situated in the southwestern portion of the Great Basin. Mountain ranges in this region are rugged and trend roughly north-to-south. They are separated by alluvium filled valleys and gently sloping alluvial aprons.

The Las Vegas Valley is oriented along a northwest-southeast axis and drains towards the south into Lake Mead and the Colorado River. The western border of the valley is formed by the Spring Mountains which consist of consolidated sedimentary rocks and range from 7,500 to 11,910 feet in height at the tip of Mt. Charleston. On the northern edge of the valley are the Las Vegas, Sheep, Desert, and Pintwater Mountains, all north-south trending mountains separated by alluvial valleys. The southern boundary is formed by the River and McCullough ranges while Frenchman and Sunrise mountains form the eastern boundary of the study area.

The mountain ranges consist mainly of sedimentary formations of limestones and sandstones intermixed with shales, dolomites, and gypsum. For much of its geological history, this region was the floor of an ancient sea which deposited thick beds of what are now limestones. Towards the end of the Paleozoic era, this ancient sea became shallower and the change in deposition resulted in the Permian red beds and the Toroweap, Kaibab, and Moenkopi limestone formations in the mountain areas. The Chinle and Aztec sandstones of Triassic and Jurassic age represent a continental deposition regime post-dating the final evaporation or retreat of the sea.

Volcanic deposit--basalt, rhyolite, and latite--exists in the southern and eastern portions of the valley as the result of Cenozoic era volcanic activity.

The alluvial fans consist of poorly sorted gravels, cobbles, and stoney deposits on the upper reaches grading to finer materials near the valley floors. Deposition began during the Tertiary and Quaternary periods and is still ongoing.

The valley floors consist of lake bottom silts and clays deposited during the Miocene and Pleistocene epochs. Subsequent faulting produced several escarpments that are major landforms within the Las Vegas Valley. These are discussed in more detail in the following section.

Local soils are generally of the Entisol and Aridisol orders. Entisols are soils which show little evidence of formation while Aridisols may have hardpans, salt accumulations, or clay accumulations (USDI, BLM 1979:4).

Hydrology

Hydrologic conditions have changed in Las Vegas Valley within the last 130 years since the valley was settled by Anglos. The development of springs in the valley and subsequent groundwater pumping have radically changed the hydrographic situation within the valley in the last 40 to 50 years.

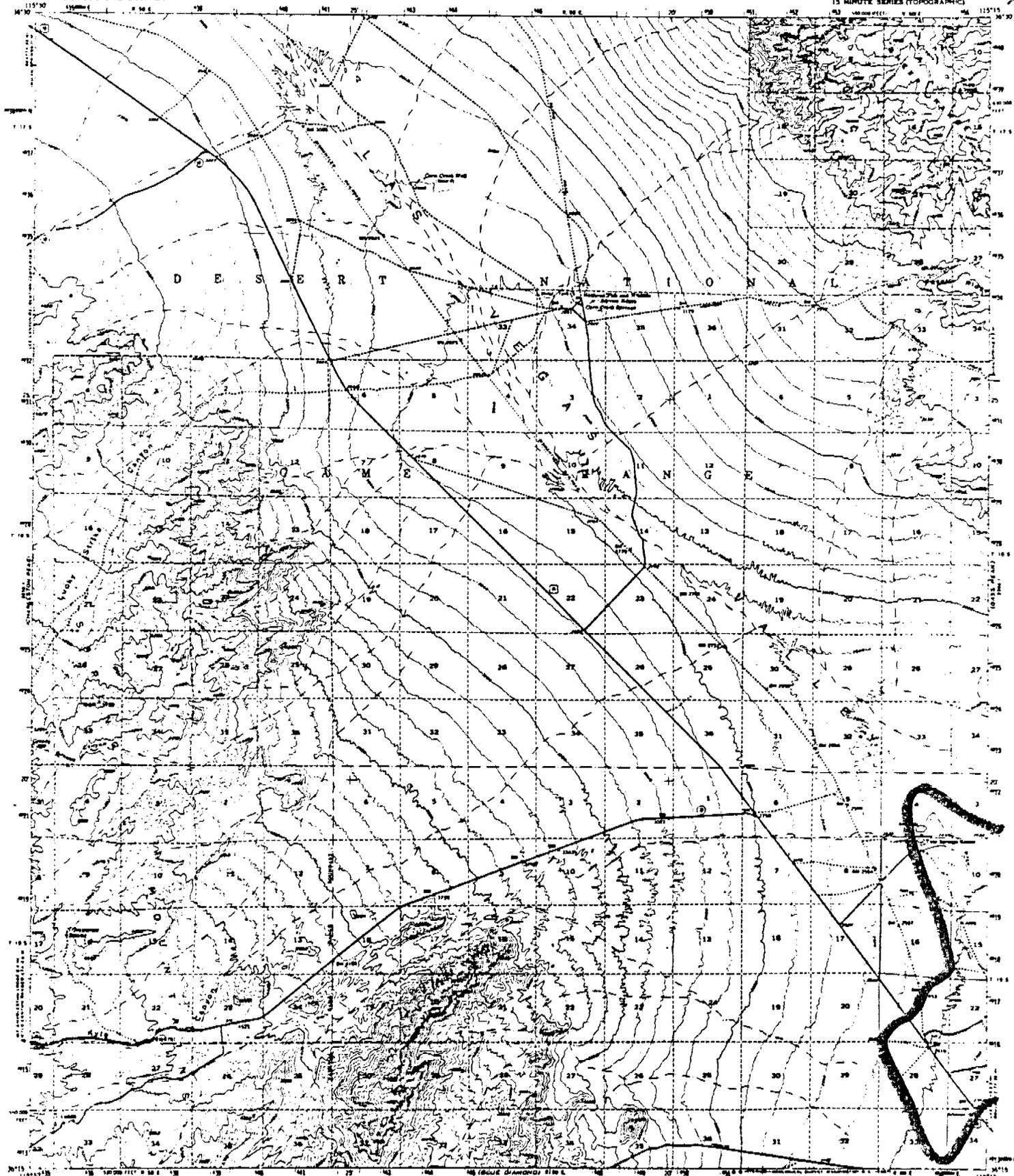
Underneath the valley is a major water bearing aquifer which Maxey and Jameson (1948:80-82) identified as being composed of late Tertiary deposits of sand and gravels overlain by similiar Quaternary age deposits. This aquifer is recharged by precipitation and runoff from the nearby mountains after winter snows and rainfall episodes. Runoff resulting from rain and snowfall on the nearby mountains, particularly the Spring Mountains, percolates into the sandstone which acts as an aquifer for water movement.

Water percolates downward and either resurfaces in the form of springs or seeps in the mountains, or continues into the upper alluvial apron gravels and drains down into the valley fill. The mountain springs and seeps, of which there are 49 known in the Red Rock Canyon area alone, were extremely important as assured water resources for both the aboriginal inhabitants of the region and the early Anglo settlers in the area (USDI, BLM 1980:33-35, Table 3-3).

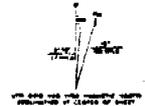
Once in the valley fill, the water becomes confined in sand and gravel beds sandwiched between relatively impermeable silt and clay layers that become more numerous towards the valley center. Artesian pressure, created by the weight of water held at higher levels on the alluvial aprons, is maintained by the silt and clay beds that prevent the upward movement of waters. When the confining beds are penetrated by wells or are broken by faults, water rises due to the pressure (Maxey and Jameson 1948:80-82).

Two main aquifers underlie the valley. The first is in the center of Township 19 South, Range 60 East, in the vicinity of Corn Creek Dunes and the Tule Spring Ranch (Figures 6 and 7). The second aquifer underlies Townships 20, 21, and 22 South, Ranges 61 and 62 East (Figure 8). These aquifers are separated from one another by the presence of several faults in the valley floor, one in the western portion of the valley, the Eglinton Escarpment, and the other, a major escarpment in the eastern part of the valley near Henderson. The latter partially defines the eastern limit of the main aquifer. These faults act as partial impediments to the movement of groundwater in the valley and are responsible for the movement of the waters to the surface in the form of springs and seeps in some areas (Maxey and Jameson 1948:69-71).

A number of seeps and springs previously existed in the Las Vegas Valley with Las Vegas Springs, Tule Springs, Big Springs, Corn Creek Springs, Stevens Springs, and Kyle Springs being the major ones. These created an



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Control by USGS and USCGS
Topography from aerial photographs by multiple methods
Horizontal accuracy about 1:500 - 1 inch equals 1.52
Vertical accuracy - 1:277 Mean American datum
10,000 foot grid based on Nevada coordinate system, and zone
Contour lines spaced approximately 100 feet
1:50,000 meter Universal Transverse Mercator grid from
zone 11, datum NAD 83
Certain land areas omitted because of
insufficient data



CONTOUR INTERVAL, 30 FEET
METERS 1:50,000 (METERS BY METERS, CONTINUED)
SCALE 1:62,500



ROAD CLASSIFICATION
 Main Road Light Road
 Unimproved Road Unimproved Road
 U.S. Road State Road

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CORN CREEK SPRINGS NEV
 4915 11515/15
 1982
 ANS 200 17-SERIES 1706

FIGURE 6- AQUIFER BOUNDARIES, CORN CREEK SPRINGS 15' USGS MAP

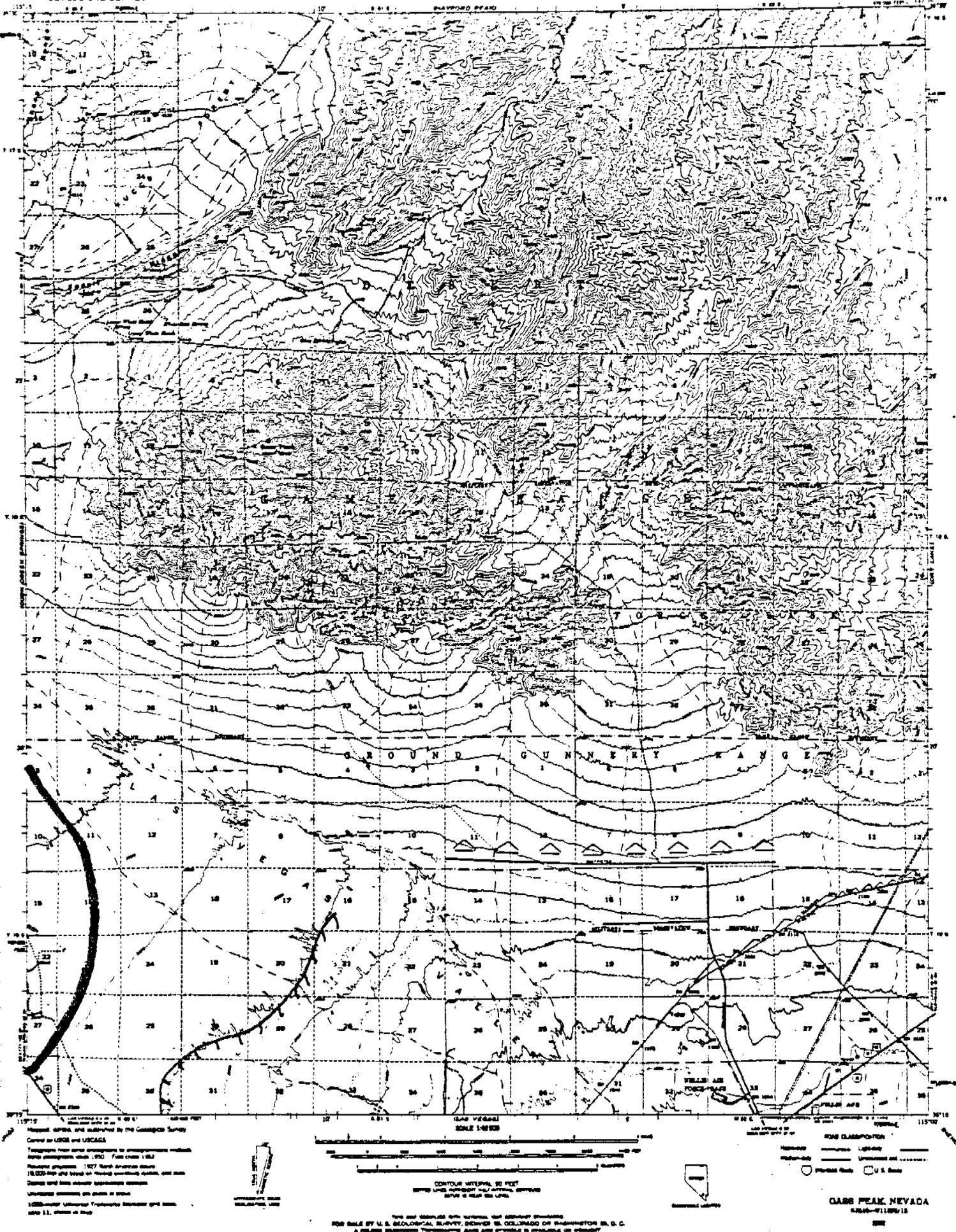
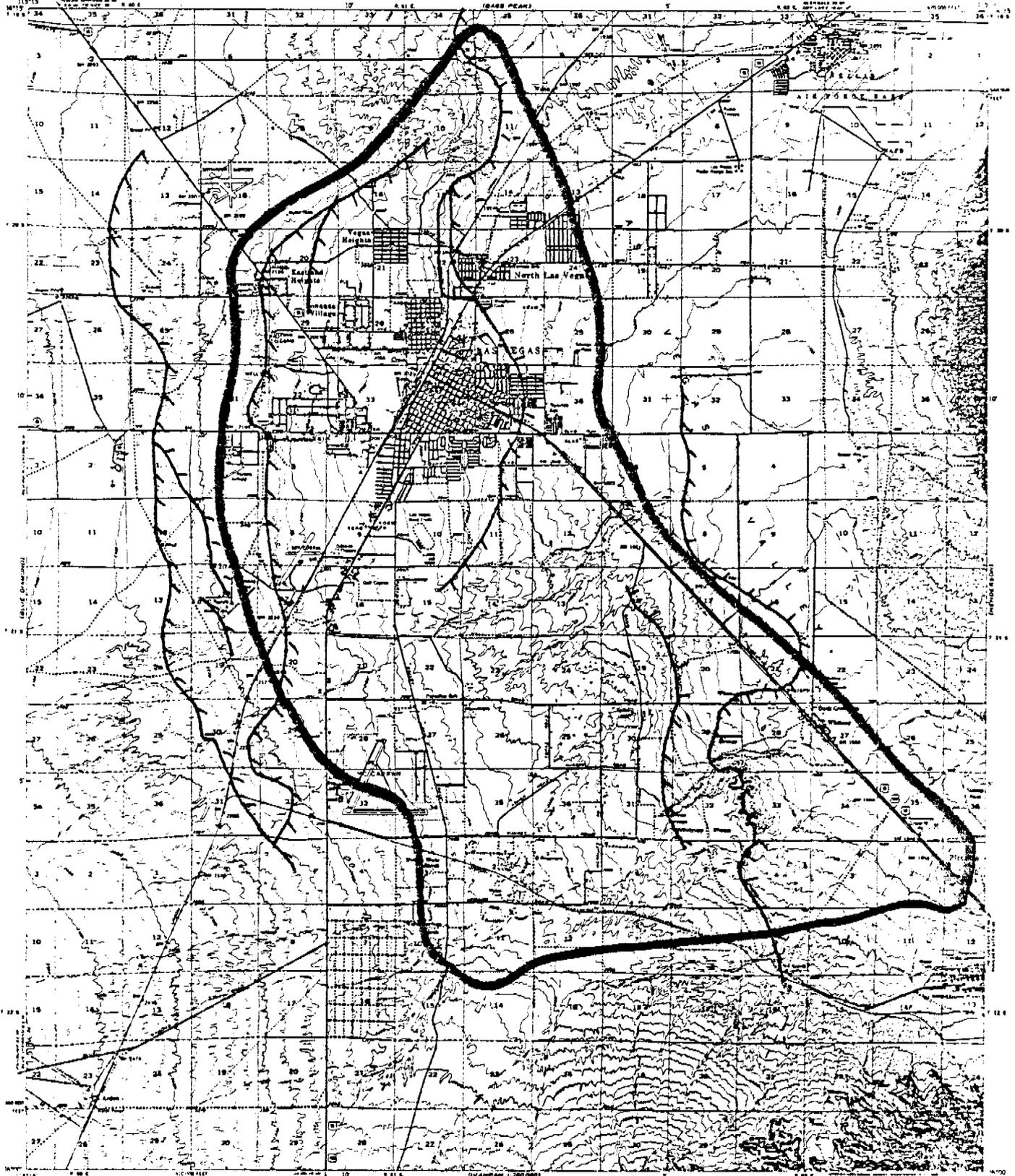


FIGURE 7- AQUIFER BOUNDARIES AND ESCARPMENTS, GASS PEAK 15' USGS MAP



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Survey of USGS and USCSGS
Photography from aerial photographs of 1:25,000 scale
and by 3-inch tilted aerials (1952). Air in stereopairs taken 1950
Revised 1952. 1:25,000 scale. 15' x 15' grid. 15' x 15' grid.
1:25,000 and 1:50,000 scale. 15' x 15' grid. 15' x 15' grid.
has not been used in which city or town buildings are shown
during the time of the publication of this edition.



ROAD CLASSIFICATION
UNIMPROVED GRAVEL ROAD
IMPROVED GRAVEL ROAD
UNIMPROVED ASPHALT ROAD
IMPROVED ASPHALT ROAD
U.S. HIGHWAY
STATE HIGHWAY

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LAS VEGAS, NEV
75000-1150015
1952

FIGURE 8- AQUIFER BOUNDARIES AND ESCARPMENTS, LAS VEGAS 15' USGS MAP

environment that encouraged the growth of grassy meadows that were watered by the Las Vegas Creek (Las Vegas meaning "the meadows" in Spanish) which originated from four large springs near the valley center and ran eastward to Las Vegas Wash and the Colorado River. This creek was approximately five feet wide and two feet deep (Paher 1971:15). Early historic photographs dating from 1903 (Jones and Cahlen 1975:4) confirm the accounts of the Mexicans, Mormons, trappers, and other early visitors to the valley (see Hauck et al. 1979). The springs formed the basis of the earliest historic settlement in the valley and of the protohistoric Paiute and prehistoric occupations which will be discussed in greater detail later. Estimates of the annual discharge of these springs (the ones individually named above) are available for the years 1905 to 1907, 1912, and 1924 to 1946 and are summarized by acre-feet in Table 1.

Table 1. Annual Spring Discharge in Acre-Feet for the Las Vegas Valley

<u>Year</u>	<u>Acre-Feet</u>	<u>Year</u>	<u>Acre-Feet</u>
1905	6400	1934	4100
1906	6400	1935	4100
1907	6400	1936	4000
1912	5300	1937	4100
1924	5100	1938	4100
1925	5000	1939	3800
1926	5000	1940	3700
1927	4800	1941	2400
1928	4200	1942	3000
1929	4100	1943	3300
1930	4200	1944	3000
1931	4200	1945	3100
1932	4100	1946	3200
1933	4100		

(From Maxey and Jameson 1948:95)

As shown in Table 1, the amount of water discharged from the springs dropped steadily. This is inversely correlated with an increase in acre-feet discharged from wells drilled in the valley during the same period. In 1912, 15,200 acre-feet were drawn from wells; by 1946 the total was 28,500 acre-feet annually. As the aquifer was tapped by the growing local population which drew increasing amounts of water from wells, less water was discharged from springs (Maxey and Jameson 1948:94).

Since 1955, the pressure on the aquifer has increased tremendously. From 1955 to 1974, a total of 1,300,000 acre-feet of water was pumped out of the aquifer. Concurrently, spring discharge dropped from 1400 acre-feet in 1955 to practically nil at the present time. During this period, most springs in the valley ceased flowing although some small springs along fault scarps in Township 21 South, Range 62 East, and along Las Vegas Wash still discharge.

The estimated total reduction in spring discharge from 1955 to 1973 was approximately 110,000 acre-feet (Harrill 1976:21, 41-43). During this period, aquifer discharge lowered the surface of the valley floor. In

1964, a study revealed that the North Las Vegas area has subsided more than three feet while Boulder City has sunk at least eight inches (Jones 1975:88-89).

Due to the lowering of the ground water level, the near aboriginal conditions of spring flow present in the valley in 1905 no longer exist. Las Vegas Creek no longer flows and the springs no longer discharge. The aboriginal vegetative cover that existed in the late 19th and early 20th centuries has disappeared. Development in the Las Vegas Valley during the past 15 years has hastened these environmental changes.

Flora and Fauna

Urban expansion, a reduction of spring discharge, and the lowering of the water table have all combined to radically change the vegetative cover of Las Vegas Valley. However, examination of conditions around the few remaining springs and review of descriptions of conditions as they were in the past (i.e. Maxey and Jameson 1948) leads to a fairly accurate reconstruction of the aboriginal and historic environment.

As discussed above, the Las Vegas area was once much better watered than it is at the present time, particularly by Las Vegas Creek, an open-air, running creek. According to George W. Bean, one of the early Mormon settlers in the valley:

"We found Las Vegas to be a nice patch of grass about half a mile wide and two or three miles long, situated at the foot of a bench 40 or 50 feet high. The valley faces east and a pretty clear stream of water, about the size of a common millrace, comes from two springs about four miles west of our location" (Bean 1855 In Jenson 1926:137-138).

Bean also mentions mesquite standing in the valley as well. Paher (1971:15) notes that cottonwoods and willows grew around the main springs and along Las Vegas Creek. Historic photographs from around springs such as Little Springs and Big Springs (Jones and Cahlan 1975:5,7) and at the "Old Mormon Fort" adjacent to Las Vegas Creek (Paher 1971:44-45) support this reconstruction of the aboriginal environment.

Further east and south of the major springs and the original Mormon settlement was a large forest of mesquite three miles wide and 12 miles long. The forest extended down Las Vegas Wash towards the Colorado River to the base of Sunrise and Frenchman Mountains. This forest served as a source of food for the Paiutes in the form of mesquite beans and the small game attracted by the mesquite cover (Paher 1971:15, 20-21; Lyneis et al. 1979:10-12).

Other small springs in the valley may have supported small stands of riparian vegetation such as the truncated system around Grapevine Springs in the Paradise Valley area of southeastern Las Vegas. Ellis and Moen (1978:4-5) described the flora around the spring as phreatophytic types associated with slightly wet, highly saline soil. The dominant vegetation includes quailbrush, salt grass, arrowweed, screwbean mesquite, and common reed along with stands of canyon grape and seepwillow.

At the edge of the springs and on alluvial slopes where the aquifer was deep, creosote was (and is) dominant in association with white bursage, salt brush, rabbit brush, shadscale, globemallow, ephedra, and minor grasses. On the upper alluvial fans to the base of the mountains, associations are variously dominated by Joshua tree and blackbrush existing in association with Spanish bayonet, mormon tea, burrobrush, creosote, hopsage, sagebrush, wolfberry, cholla cactus, and beavertail cactus. In the Spring Mountains, small canyons cut into the face of the Red Rock Canyon sandstone escarpment offer cooler temperatures, higher elevations, and greater moisture conditions which support several associations. A pinyon-juniper association dominates the upper elevations while the canyons contain microenvironments that include various percentages of cholla cactus, gamble's oak, rice grass, goose foot, wild onion, squaw berry, agave, service berry, and localized stands of ponderosa pine and pinyon-juniper (Maxey and Jameson 1948:22-23; USDI, BLM 1980:58-62).

The fauna of Las Vegas Valley was characterized by those species generally associated with the creosote community: a variety of lizards and avifauna (Gambel's quail being most important); small mammals including blacktail jackrabbit, kangaroo rat, whitetail antelope squirrel, desert cottontail, kitfox, badger, bobcat, and a variety of small rodents; plus Gila Monster and desert tortoise (Bradley and Deacon 1967:212-213). As one moves into the nearby mountains, larger game animals occur: bighorn sheep, mule deer, mountain lion, and other game animals. Evidence of the exploitation of these resources, both floral and faunal, by aboriginal inhabitants of the region, exists in the form of macrofaunal and macrofloral remains from archeological sites (bones, seeds, and charred organic material) and in the form of bighorn sheep petroglyphs that testify to their value as a game animal. These resources have been exploited by the various culture groups that have inhabited the region for thousands of years. The patterns of exploitation will be discussed in the various sections concerned with the culture history of the area.

PALEOCLIMATIC HISTORY

The post-pluvial environment of the Great Basin has received quite a bit of attention in the last 35 years. Antevs' (1948, 1952, 1953, 1955) post-pluvial reconstruction has utility throughout the Great Basin as a general concept although the climates and associated environmental conditions varied from locale to locale (Cressman 1977; Bryan and Gruhn 1964). In general, Antevs suggested a neothermal period with three divisions:

Anathermal (ca. 10,000 to 7,000 B.P.): A warm, humid period characterized by greater effective rainfall, the heyday of the pleistocene lakes, and an environment that supported megafauna. It was characterized at the end by a progressive warming trend.

Altithermal (ca. 7,000 to 4,500 B.P.): An arid period in the basin marked by greatly reduced effective moisture, disappearance of the Great Basin lakes, and a much warmer climate than at present.

Medithermal (ca. 4,500 B.P. to Present): A moderately warm era with somewhat increased effective moisture. Conditions have remained generally constant in the Las Vegas Valley to the present time.

Within the Las Vegas Valley, although the general outlines are similar, the approximate dates of occurrence of these various thermal periods differ from Antevs' basin-wide reconstruction. Both Haynes (1967) and Mehringer (1967) studied the geology and pollen profiles of the Tule Springs area and the following climatic reconstruction is based on their work. It addresses the full time span of human occupation in the Las Vegas Valley.

Prior to 15,000 B.P., Lake Las Vegas, a large pluvial lake, was created by the blockage of the pleistocene Las Vegas River. The lake occupied most of the valley from Corn Creek Dunes to the southeastern portion of the valley. Vegetation in the valley consisted mainly of pine and sagebrush on the alluvial fans and bajadas, and cattail in the shallow water around the lake margins. Mammoth and camel remains have been recovered in lake deposits dating from this era. The pollen spectra that date from 31,300 to 22,000 B.P. suggest that the present woodland area, the juniper-pinyon zone, occurred on the valley floor at this time.

The period from 14,000 to 13,000 B.P. provides the best pollen evidence for the presence of a juniper-sagebrush community on the valley floor. Fossil wood has also been discovered in strata dating to this period. Lake Las Vegas was drained by this time leaving a small river flowing down the course of what is now Tule Springs or Las Vegas Wash. Paleontological evidence indicates the presence of mammoths, camels, horses, dire wolf, and other, now extinct megafauna, and man himself may have appeared at this time.

Around 12,000 B.P., a major change in the pollen record indicates a replacement of the juniper-sagebrush community on the valley floor by a sagebrush-shadscale community indicative of a warming and drying trend. Pleistocene megafauna became extinct and the human occupation was definitely established by this time. By 7,000 B.P., the valley was much like the current lower elevation Mojave Desert, but much drier than at present. After 7,000 B.P., a gradual cooling trend brought the Las Vegas Valley to its present climatic and environmental state, though this state has been further modified by modern development and groundwater pumping.

Each of these different paleoclimatic regimes had repercussions on the way various culture groups adapted to the valley. Radical changes in subsistence and settlement patterns have occurred in the last 12,000 years tempered greatly by the climatic regimes. As will be seen, each group adapted to the environment in its own unique way providing a lengthy archeological record of human potential and reality in the Las Vegas Valley.

PREVIOUS RESEARCH IN THE LAS VEGAS VALLEY

The history of archeological research in the study area is a history of neglect and lost opportunities, at least until the late 1960s and early 1970s. Despite early knowledge that there were a wide variety and number

of archeological sites in the study area, until the 1930s research focused on the Muddy and Virgin River Valley area, the region of the heaviest Anasazi occupation. Nonetheless, early efforts included work by Duffield (1904) who recorded rockshelters, petroglyphs, roasting pits, and turquoise quarries in the mountainous area of the Spring Mountains. Prior to the 1930s, very little other work was conducted. Harrington et al. (1930:16) reported visits by A.V. Kidder to a cave near Jean, Nevada, where he collected specimens of pottery he identified as Paiute, Anasazi, and Mojave. H.P. Mera collected Puebloan potsherds at Tule Springs and in 1921, N.C. Nelson visited Las Vegas and observed pottery at several locations. Only Kidder reports any of this material by including the local Anasazi settlement on a map as constituting the "northern peripheral" area of Anasazi occupation (Kidder 1924; see Hauck et al. 1979:23-24 for further discussion). Remarkably, a 30 minute USGS topographic map of the 1915 series, stored in the Special Collections Room at UNLV, has symbols documenting a variety of sites--Anasazi, Paiute, and others--within the Las Vegas Valley. The actual recordation date of this map is unknown, but it likely dates from the early 1920s or 1930s.

Although the earliest archeological work in southern Nevada centered in the Muddy and Virgin River Valleys, the 1930s saw Harrington conduct excavations at two sites destined to become focal points in the dispute concerning the antiquity of man in the New World. First he pursued excavations at Gypsum Cave situated on Frenchman Mountain near the eastern boundary of the study area. Harrington uncovered an apparent association of layers of extinct ground sloth dung, Gypsum style points, dart shaft fragments, and fragments of extinct camel and horse (1933). These associations were later to prove spurious.

In connection with the 1930 Gypsum Cave expedition, Mrs. Bertha Cody, an assistant to Harrington at the Gypsum Cave excavations, visited Corn Creek Dunes and reported camel bone weathering out of the lake beds south of the springs at Corn Creek (Harrington and Simpson 1961:125).

The second major site at which Harrington worked was the Tule Springs Site in the northwestern portion of the study area. This site was serendipitously discovered by Fenley Hunter in 1933 who, when examining the paleontological deposits of Tule Springs Wash, discovered a worked obsidian flake in association with the extinct fauna. This association was brought to the attention of George G. Simpson who examined the bones and the artifact (Simpson 1933). Based on this data, Harrington visited the site in 1933 and recovered samples of ash, charcoal, fossil bone, stone tools, and a bone tool (1934a, 1934b, 1941). The charcoal samples from this site were submitted for dates in the 1950s, some twenty years after their collection. A date of 23,800 B.P. (Haynes 1967) sparked a controversy that lasted until the Nevada State Museum (NSM) conducted excavations in the 1960s to solve the question.

Also in the 1930s, William S. Parks, an amateur archeologist, conducted excavations at Big Springs in the Las Vegas Valley where he uncovered the ruins of a Puebloan village of five rooms. He kept no notes, photographs, or plans, but the artifacts and catalogue cards are on file at Lost City Museum in Overton. This site was destroyed in the 1970s by the Las Vegas Valley Water District storage facilities, but the area adjacent to these

lands still contains data that can shed light on the Anasazi occupation of the Las Vegas Valley (Warren et al. n.d.; Lyneis et al. 1978; Lyneis 1982a). These sites will be discussed in more detail in the next section.

The late 1930s and 1940s seem to have been a quiet period archeologically in the study area with little archeological research being conducted. Harrington is reported to have visited the Spring Mountains and to have recorded the roasting pit complex at Willow Springs in the Red Rock Canyon Recreation Lands (RRCRL) (Shutler and Shutler 1962). Other archeological work was also conducted by the National Park Service at Lake Mead, adjacent to the study area. These surveys shed some light on the extent of Puebloan occupation in the region, but had no direct impact on the data base for the Las Vegas Valley (Brooks, Brooks, and King 1977).

The 1950s saw a marked increase in archeological research in the study area, but research was essentially confined to the major site zones of Tule Springs and the Corn Creek Dunes area. Work at these sites was continued by the NSM in the early and mid-1960s. In 1955, Harrington returned to Tule Springs on the strength of the 23,800 B.P. radiocarbon date derived from charcoal collected in 1933, relocated the 1933 sites, and continued excavations at these sites. This expedition collected the remains of pleistocene megafauna, but only one bone tool. The following year, puzzled by a lack of artifacts, Harrington returned to the area to continue excavations, but again the results were disappointing; more pleistocene mammal remains and a scraper in a deposit of charcoal and camel bone were recovered. The charcoal sample was radiocarbon dated at 28,000 B.P. (Harrington and Simpson 1961:51-76).

The 1956 expedition also resulted in a surface survey of other areas including the Corn Creek Dunes area. Stuart Peck undertook an extensive surface survey west of the Tule Springs site joined by other members of the expedition. He recorded a variety of different artifacts on the benches north and south of the Las Vegas Wash including Pinto, Lake Mojave, Silver Lake, Gypsum, and Basketmaker dart points, and other miscellaneous debris (Harrington and Simpson 1961:108-125; Peck 1957:116-120). Harrington and Peck also conducted a one-day survey in the Corn Creek Dunes area recording several campsites consisting of choppers, hammerstones, scrapers, cores, and other cultural debris (Harrington and Simpson 1961:125-130).

Due to a dispute over the age of the radiocarbon dates and the association of artifacts with charcoal and pleistocene megafauna, the NSM launched one more expedition to Tule Springs in 1963. This expedition excavated five site locales and also conducted palynological, geological, and paleontological research.

Five hearths were dated between 10,000 and 12,400 B.P. A scraper, five flakes, and a potential bone tool were the only cultural materials recovered. It was also discovered that Harrington's date came from carbonized plant remains associated with an extinct spring mound and that several polished bone artifacts recorded by Harrington as tools were quite likely the result of tumbling in the "eye" of a spring which polished and abraded

the objects (Wormington and Ellis 1967). Thus, instead of proving the presence of man in southern Nevada nearly 30,000 years ago, the earliest date that can be claimed is less than 13,000 B.P.

The NSM expedition also produced another surface survey at and around Tule Springs and additional work at Corn Creek Dunes. Susia (1964) conducted surface surveys on the north and south sides of Las Vegas Wash in the Tule Springs region. She recovered and recorded choppers, hammerstones, knives, cores, scrapers, Pinto points, and other artifacts that she associated with the Pinto Period (5,000 to 2,000 B.P.). Williams and Orlins (1963) conducted a surface collection and limited test excavation at the Corn Creek Dunes Site collecting charcoal samples from six surface hearths as well as scrapers, choppers, cores, milling stones, knives, projectile points, and other refuse. The hearths yielded seven radiocarbon dates ranging from 5,200 + 100 B.P. to 4,030 + 100 B.P. Additional survey in the area identified five other prehistoric loci, three yielding Puebloan pottery and artifacts, and two yielding lithic waste debris.

The 1960s saw the real beginning of work in the southern Nevada area. Shutler (1961) published a compilation of Harrington's Lost City work conducted in the 1930s forming the baseline for future work in Anasazi studies. Also, in conjunction with his wife, he conducted limited surveys of the Valley of Fire and RRCRL areas (Shutler and Shutler 1962). Additionally, Heizer and Baumhoff (1962) concluded their study of Great Basin rock art recording sites outside, but near, the Las Vegas area. Finally, at this time the early dates for Gypsum Cave points were refuted. Several dart shaft fragments from the cave were submitted for radiocarbon analysis and were found to be no more than 3,000 years old (Berger and Libby 1967; Heizer and Berger 1970).

The late 1960s and 1970s began what Hauck et al. (1979:30-33) called the "Contract Archeology Period." The BLM was required by law to take an active interest in cultural resource protection and additional legislation created the necessity for the consideration of cultural resources in any project conducted or sanctioned by the Federal Government. Figures 1 through 5 note the locations of all projects conducted by the BLM and other entities under the aegis of Federal law in the study area since 1970. Since the volume of activity has been extensive, only major projects of large scope or importance will be discussed in the last part of this section.

The Spring Mountains, particularly the RRCRL area, have seen extensive work conducted since 1967. From 1967 to 1969, UNLV conducted a series of small scale archeological surveys in the RRCRL area and the UNLV archeological field class conducted additional survey and excavations in the region (Brooks 1969; Crabtree, Rodriguez, and Brooks 1970; Rodriguez and Rodriguez n.d.). Moen (n.d.) conducted research on southern Nevada petroglyph sites including many in the RRCRL area.

In the 1970s, UNLV conducted a complete survey of the Spring Mountain State Park and Pine Creek areas for the Nevada Division of State Parks (Brooks et al. 1974). They also conducted three major surveys for the

BLM, one keying on small, specific locations (Brooks et al. 1976) and two being Class II sample surveys (Brooks et al. 1977a, 1977b). Master's theses deriving from UNLV's RRCRL work include Cunningham's (1978) study of Lone Grapevine and Scrub Oak Springs, Larson's (1978) study of southern Nevada settlement patterns, and Turner's (1978) excavation of Mule Springs Rockshelter.

Elsewhere in the Spring and Bird Springs Mountains, projects germane to the study area include UNLV's survey of the Toiyabe National Forest which recorded dozens of sites and resulted in the testing of Lennie's Site, a stratified rockshelter in the pinyon-juniper zone (Brooks, York, and Massey 1972). Additional work in the region includes the Mack's Canyon Burn mitigation survey (Ellis 1981) which recorded rock rings, rock shelters, and lithic scatters, and test excavations at Bird Springs (Ancient Enterprises 1980), a deeply stratified rockshelter south of the study area in the Bird Springs Mountains. There are also a number of clearance surveys that have been conducted by the BLM (Rafferty 1981b, 1982b, 1982c) and the preparation of a management plan for Brownstone Canyon in the RRCRL area (Rafferty and Rolf 1981; Rafferty 1982d).

In the Las Vegas urban area, the 1970s and 1980s have seen a large number of projects consisting mostly of small surveys conducted by the BLM and UNLV. Several major surveys, in terms of acreage or results, have also been undertaken such as the Environmental Impact Statement for the construction of the U.S. 95 East Leg (NDOT 1976), the Santini-Burton Land Sale projects (Rafferty 1981a, 1982a, 1983a), the Las Vegas City inventory of the early 1970s that recorded dozens of prehistoric sites, the later city inventory that produced two archeological reports (Lyneis et al. 1978, 1979) and an historic preservation inventory and planning document (Page and Associates 1978), and several other large acreage projects (i.e. Rafferty 1983b, 1983c).

The 1970s also saw several excavations take place in the Las Vegas area including those at Grapevine Springs (Ellis and Moen 1978; Crownover and Leavitt 1979), Big Springs (Warren et al. n.d.), the Berger Site (Crabtree, personal communication, 1982), and the Midby Site (Brennan and Green 1982). There were also surface collections undertaken by the Archaeo-Nevada Society at the Twin Dunes Site in the early 1970s (Lyneis et al. 1979: 47-49).

The southeastern portion of the study area saw a wide variety and number of projects, both survey and mitigation, taking place for powerlines and other transmission corridors. The Navajo-McCullough project dissected the Las Vegas Wash area east of Henderson and recorded dozens of sites. Only one site in the valley, the Basic Site, was tested during this project (Brooks and Larson 1975). The same Las Vegas Wash area has been the scene of much more work in the last 10 years, mostly for the Colorado River Basin Salinity Control project. There have been two preliminary testing and survey phases (Ferraro 1975, 1980) and a final report on the project (Ferraro 1982). The IPP project has also conducted surveys in the Las Vegas Wash area (Tucker 1982). Finally, the Mead-Decatur 230 KV line was surveyed through the Las Vegas Valley (Brooks 1980).

Despite the amount of work completed in the Las Vegas Valley, little is yet known about its prehistory. This overview highlights the salient aspects of the major projects conducted in the study area. However, more research in the remaining site complexes must be completed before we can truly grasp the situation as it existed in the prehistoric and protohistoric past.

CULTURE HISTORY OF THE LAS VEGAS VALLEY

The following synthesis is an attempt to make comprehensible the mass of data that exists in the literature and the report and site files of the BLM and UNLV. As such, it is fairly speculative and draws in material from outside the immediate study area, particularly from projects and excavations conducted in the Spring and Bird Springs Mountains. It will be shown that the Las Vegas Valley has been a major locus of occupation during the last 10,000 to 13,000 years, particularly during the Puebloan era.

The chronology employed is one developed by Hauck et al. (1979) for the Clark County Class 1 Overview from a synthesis of formulations suggested by Shutler (1967) and Warren and Crabtree (n.d.). The internal history and external connections of groups in the valley to other regions will be discussed and hopefully will form a baseline for future research and management in the Las Vegas Valley. Research questions will be discussed in the section following the discussion of culture history.

Tule Springs Phase (13,000 to 10,000 B.P.)

This period is considered to be the Paleo-Indian or big game hunter phase of the prehistoric occupation of the study area. It is defined essentially by the work conducted at Tule Springs by Harrington (1934a, 1941, 1954, 1955a, 1955b; Harrington and Simpson 1961) and the later work conducted by the NSM at the site (Wormington and Ellis 1967). The cumulative results from expeditions to the site were the recovery of five hearths, 11 nondescript artifacts, and seven radiocarbon dates ranging from 10,000 to 13,000 B.P., along with the remains of horse, camel, mastadon, and other pleistocene megafauna. The environment at the beginning of this era would have been ideal for megafauna and their human pursuers; a juniper-sagebrush community on the valley floor, a small river running down the Las Vegas Wash, increased effective rainfall, and the presence of standing water in the now dry lakes that dot southern Nevada (see Paleoclimate section above).

There is precious little other evidence of Paleo-Indian occupation in the study area. Brennan (personal communication, 1982) and Brooks (personal communication, 1982; Brooks and Larson 1975) report that amateurs recovered a Sandia Point in the Rainbow Gardens area east of Las Vegas and fluted points on the west side of the Las Vegas Valley. Perkins (1967, 1968) has also reported several isolated fluted points found on the west side of the valley. There is problematic evidence of Paleo-Indian utilization of the Bird Springs Range. The report of the excavations at Bird Springs (Ancient Enterprises 1980) cites testimony from amateurs that unauthorized excavations uncovered two fluted points from deep within the midden at the site.

A report of Paleo-Indian use of an upland zone should not be surprising given new research into the problem area. Davis (1963), noting that the majority of fluted points have been found on old lakeshores, hypothesized that the settlement/subsistence pattern of the western Paleo-Indian was primarily oriented around the hunting of megafauna in the grassland/parkland environment around the pleistocene lakes. However, this writer considers it illogical to assume that hunting megafauna formed the basis of Paleo-Indian subsistence. Ethnographic studies (Lee and Devore 1968) indicate that even big game hunters in Africa derive the majority of their subsistence from floral resources.

Lithic evidence from Paleo-Indian sites such as Lindenmeier in Colorado suggests many tools that could have been or were used to process floral resources (Wilmsen 1970). Wilmsen also notes that in Arizona, hackberry remains were recovered at the Levi Site and specialized sites for plant processing such as Double Adobe were found (Martin and Plog 1973). Galdikas (1970), in a analysis of Paleo-Indian sites, saw evidence of small game at a number of sites including Ventana Cave (Haury 1950), Double Adobe, and others.

Based on archeological data, Martin and Plog (1973) suggest that the Paleo-Indians made camps in a variety of resource zones ranging in size from large base camps in the lowlands where multi-family or band-size groups gathered, to kill sites in the lowlands with large numbers of butchered animals, smaller high altitude special activity sites for hunting and gathering of wild flora, and medium size mid-altitude camps where bands or families gathered prior to dispersing into the uplands or lowlands. Sites such as Bird Springs may have been specialized hunting/gathering camps. Floral resources such as agave, mesquite, datura, cholla, and Joshua Tree now exist in the area and Juniper, being depressed at that time at least 1500 meters from its present elevation, would also have been exploitable for its berries and for wood for tools and fires. Fauna (sheep, mule deer, desert tortoise, and jackrabbit) exist in the area and probably did in Paleo-Indian times. Given a wide range of resources available in the nearby mountains, it is likely that specialized activity and medium size base camps exist in the mountains or their foothills, but have yet to be discovered. Evidence of such an occupation along the margins of the valleys and in the foothills will be recorded if an effort is made to locate them.

The springs in the valley would also have provided water and grazing for megafauna and other animals. Thus, it is quite likely that Paleo-Indian campsites, or even kill sites, could still be discovered on the undisturbed portions of the valley floor. These would likely be intermingled with the evidence of later occupations since the springs provided the critical variable (water) for occupation in the later, more arid, periods of occupation.

San Dieguito Phase (9,000 to 7,500 B.P.)

This phase has been defined at the C.W. Harris site on the California coast at San Diego and sites of this age are primarily found in association with pleistocene Lake Mojave in California. It is characterized by

sites on extinct, late pleistocene lake terraces. Sites usually contain small cleared circles approximately six feet in diameter which may be living floors. Artifacts associated with these features include Lake Mojave and Silver Lake points, scrapers, borers, small bifacially flaked knives, crescents, and other bifacially flaked tools (Cambell et al. 1937; Rogers 1939). According to Hauck et al. (1979:43), Lake Mojave points are "a long triangular type with slight shoulders and a gradually tapering stem. The Silver Lake type has a stem and more pronounced shouldering. Both point types were manufactured by a combination of percussion and pressure flaking techniques" (see Figures 9 and 10). Davis (1963) sees this period as one where the initial subsistence orientation was utilization of lower elevation grasslands and lakes with a later shift to a seasonally transhumant settlement pattern as the pleistocene lakes evaporated and the megafauna disappeared.

Evidence for this phase occupation in the study area is sparse. Harrington and Simpson (1961) and Susia (1964) reported Lake Mojave and Silver Lake points on the ground surface near Tule Springs. Brennan and Green (1982:9) report surface material in the Duck Creek area in southeastern Las Vegas that suggests an occupation that may have begun as early as 8,000 B. C. Additionally, a survey along the Eldorado/Kaiparowits transmission line on the eastern edge of the study area yielded one Silver Lake point on a bench in the River Mountains (Brooks et al. 1977c). Given these solitary discoveries, the data base for this period is quite sparse. It would be surprising if, given the abundance of springs in the study area and availability of the floral and faunal resources in the valley and nearby mountains, Las Vegas Valley was not more heavily used by San Dieguito era peoples. It is suggested that further archeological research in the Duck Creek area and the nearby RRCRL/Spring Mountain region will reveal a larger San Dieguito component in the archeological record of the study unit.

Hiatus (7,500 to 5,500 B. P.)

According to Hauck et al. (1979), during this period Clark County was essentially devoid of human occupation owing to a lack of archeological evidence. This period is at the height of Antevs' (1948) Altithermal, an extremely dry and arid period in the Great Basin.

Despite the seeming lack of occupational evidence, incredibly arid conditions must have occurred to end the flow of water from the many springs in the study area, particularly the larger ones including Big Springs. Although flow may have been decreased and the floral communities reduced and elevated, it is still probable that the study area was habitable and that material dating to this period will be located in the Spring Mountains in stratified rockshelters.

Little Lake-Pinto-Gypsum Phase (5,500 to 2,000 B. P.)

This era is generally designated as the Archaic or Desert Culture Period and is heavily represented in the study area both in the valley and the nearby RRCRL/Spring Mountains area. This phase encompasses Shutler's (1967) Corn Creek Dunes and Pinto-Gypsum Periods and Warren and Crabtree's (n.d.) Pinto and Gypsum Periods. Hauck et al. (1979:45-50) compress the

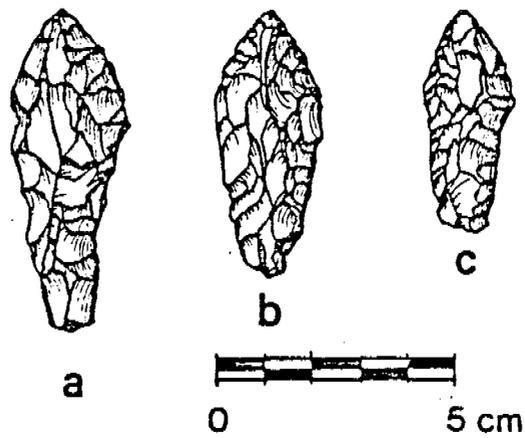


FIGURE 9- LAKE MOJAVE POINTS (From Hester and Heizer 1973)

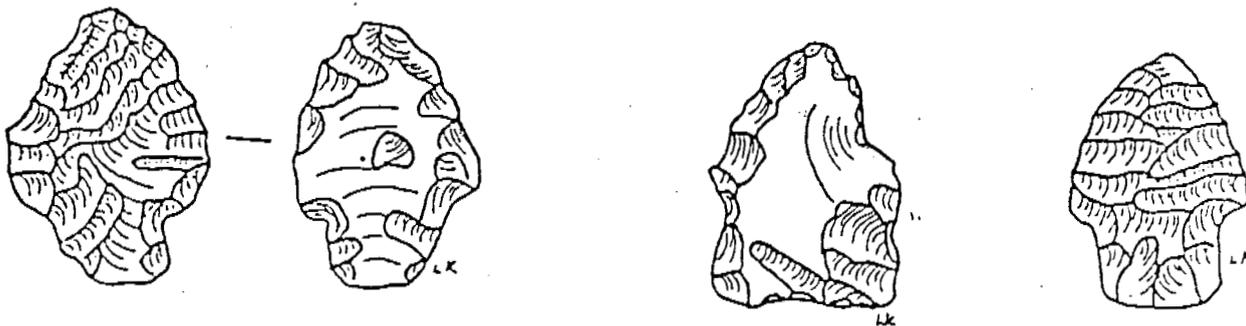
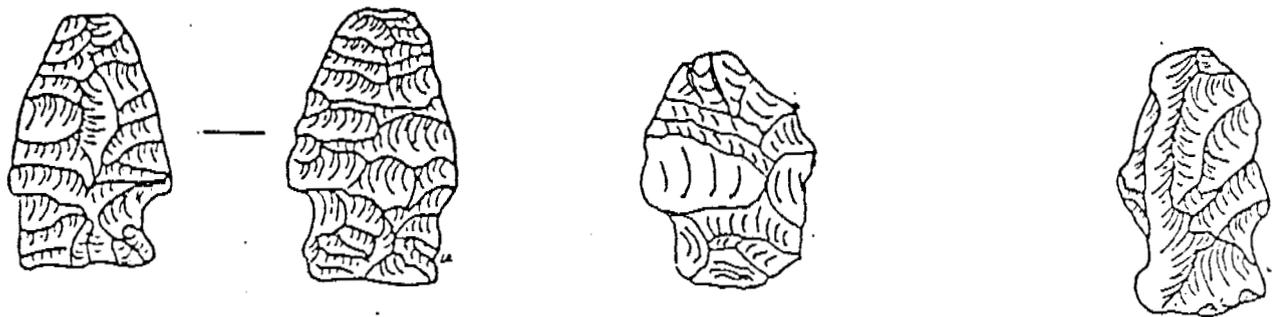


FIGURE 10-SILVER LAKE POINTS (From Crownover 1981)

two periods defined by both Shutler, and Warren and Crabtree on the basis of the temporally overlapping, time sensitive, projectile point styles. Williams and Orlins (1963) recovered one Humboldt point at the Corn Creek Dunes Site which was dated by association with radiocarbon dated hearth material at between 4,000 and 5,200 B. P. Since this point was stylistically different from either Pinto or Gypsum points, Shutler defined his Corn Creek Dunes Period on the basis of this point. Hauck and Weder (1978) have reviewed the pertinent archeological literature and state that Pinto and Humboldt points are quite often found together in contemporary strata. Thus, Shutler's phase has been eliminated.

Hauck and Weder (1978) defined a Pinto-Humboldt point complex occurring in southern Nevada by 5,000 B. P. Gypsum points and their associated artifact assemblages occur in O'Malley Rockshelter between 5,000 and 7,000 B. P. and at Gypsum Cave between 2,900 and 2,400 B. P. Thus, the Pinto-Humboldt and Gypsum assemblages overlap temporally, but not spatially. Hauck et al. (1979:48) suggest that the two complexes are diagnostic of two distinct cultural groups after 5,000 B. P. since the Pinto-Humboldt association is widespread in the Great Basin after 5,000 B. P. while Gypsum points are restricted to southern Nevada. This is a question that cannot be fully discussed here. However, this data does call into doubt Warren and Crabtree's (n.d.) division of this era into separate Pinto and Gypsum Periods.

The distribution of these point types and site loci indicate a change in the settlement/subsistence pattern from that of the San Dieguito Period. Sites are located in a wide variety of environmental zones: the Las Vegas Valley spring zone (Williams and Orlins 1963; Ellis 1983a; Crownover and Leavitt 1979; Ellis and Brennan 1982); the mountains, foothills, or upper desert zone (Turner 1978; Rodriguez and Rodriguez n.d.; Ancient Enterprises 1980); the well watered riparian canyon areas of the lower Spring Mountains (Brooks 1969; Brooks et al. 1974, 1977a, 1977b; Cunningham 1978); and the upper pinyon-juniper zone of the Spring Mountains (Brooks, York, and Massey 1972; Ellis 1981). A seasonally transhumant settlement pattern is indicated in which both upland and lowland areas are exploited on a seasonal basis. Bettinger and Baumhoff (1982) attribute this pattern to pre-Numic groups and call it a traveller subsistence pattern. Binford (1980) calls this a forager strategy. Bettinger and Baumhoff (1982) state that travelers depend on high quality resources (i.e. bighorn sheep and highly ranked floral resources) that require great travel time but low extraction and processing costs. They cite an abundance of pre-Numic sheep petroglyphs and projectile points at widely spread site loci in highly ranked floral areas as evidence for their contentions. This would account for the wide distribution of Archaic or Pinto-Gypsum sites in southern Nevada if their theory can be applied to southern Nevada. This is an idea that bears investigation.

In the Las Vegas Valley, three sites best represent this time period; the Corn Creek Dunes Site (Williams and Orlins 1963), the Las Vegas Wash complex (Ferraro 1975, 1980, 1982), and 26 CK 3186/NV-05-4639 (Ellis 1983a). The Corn Creek Dunes Site was a series of seven surface and subsurface hearths associated with artifacts located 26 miles west of the

Las Vegas urban area. This site is located near a now extinct spring. The artifact assemblage consisted of manos, metates, bifacially flaked knives, scraping tools, hammerstones, utilized flakes, and a Humboldt point. Other Humboldt points were located nearby. Seven radiocarbon dates ranging from 4,030 + 100 B.P. to 5,200 + 100 B.P. were acquired from the site. Williams and Orlins (1963) suggest that the site was used as a temporary camp by groups traveling between mountain ranges. Local food was available in the form of small animals and seeds from nearby floral resources. They also believed that this assemblage represented an eastward extension of the southern California Pinto Culture.

The Las Vegas Wash archeological complex consists of 42 archeological sites ranging in age from Pinto-Gypsum to protohistoric Numic sites and one historic site. Ferraro (1975) describes a number of the sites as "fragile pattern sites"; twenty-eight sites contain circular or oval features from which the desert pavement has been removed and which are often lined with a ring of stone. These features are associated with quartz and basalt chipped stone artifacts and manufacturing debris. Ferraro equates these with similar features located by Rogers (1939), Shutler et al. (1960), and Hunt (1960) elsewhere in the Great Basin which date back to the Pinto cultural era or Death Valley II. Artifacts such as Elko points and perhaps some Humboldt points found associated with these features confirm a late Pinto-Gypsum or early Puebloan date for several of these sites.

These sites may have been the scene of both floral and faunal exploitation as cottonwood, mesquite, arrowweed, cattail, pickleweed, waterfowl, and nearby, bighorn sheep, are available in the area.

The last Las Vegas Valley site representing this period is 26 CK 3186/NV-05-4639 (Ellis 1983a), a surface/subsurface campsite located in the Duck Creek area of Las Vegas. This site consists of two loci of lithics; fire-cracked rock; charcoal stained soils; four Elko, two Pinto, and two Humboldt points; and some ground stone fragments. Based on the point styles and the lack of ceramics, Ellis estimated the age at 2,000 B.C. to A.D. 500, during Warren's Gypsum period.

Dozens of archeological sites exist in the Las Vegas Wash/Duck Creek area and near many of the historically running and extinct springs. Many are suspected to be of Pinto-Gypsum age. Further research in the area would probably yield considerable data on the occupation of the valley during this time period.

In the mountain foothills, three rockshelters, the RJK Site (Rodriguez and Rodriguez n.d.), Mule Springs Rockshelter (Turner 1978), and Bird Springs (Ancient Enterprises 1980) contain data pertaining to this era. Only two projectile points dating to this era, one Humboldt and one Elko point, were found at Bird Springs. The RJK Site contained one point that might fit the description of a Pinto-Gypsum era point while Mule Springs Rockshelter contained two Humboldt series points and one Pinto point. It is suspected that the Pinto-Gypsum occupation of these sites was sparse and sporadic. These shelters could easily have served as base sites for

the exploitation of agave, deer, mountain sheep, rabbit, other rodents and lizards, various seeds, and water since they are all available at or near active springs.

Another site dating to this period is the Mormon Wells Site which is situated in the northern extreme of the study area on the Desert National Wildlife Range. Although this site has not been recorded, Blair (personal communication, 1983) reports that the site contains Pinto, Gypsum, and Elko points in association with several roasting pits.

Exploitation of the riparian canyon regions of the Spring Mountains during the Pinto-Gypsum period was represented by the presence of "Gypsum Cave-like" points at rockshelter 26 CK 454, partially excavated by an amateur in the 1960s (Brooks 1969:4). Several surveys of the RRCRL by UNLV in the 1970s (Brooks et al. 1974, 1977a, 1977b) revealed Pinto points in the Willow Creek area and in the vicinity of the Spring Mountains State Park. Cunningham's (1978) research at Lone Grapevine and Scrub Oak Springs recovered five Elko style points and recorded petroglyphs similar to those which Heizer and Baumhoff (1962) describe as Great Basin curvilinear style and dating back as early as 1,000 B.C. Finally, Crabtree et al. (1970:7-8) suggest a very heavy pre-ceramic (pre-A.D. 500) exploitation of the region based on the fact that only one-sixth of the known sites contain pottery and on similarities in artifact types to known pre-ceramic artifact styles.

Evidence for the exploitation of the pinyon-juniper zone was recovered at Lennie's Site (Brooks, York and Massey 1972) in the Spring Mountains and Gypsum points were noted among the surface finds in the Mack's Canyon area on the eastern slopes of the Spring Mountains (Ellis 1982).

Further evidence of an archaic presence in the area may eventually be discovered by future excavation of roasting pits. These features, used to roast agave, cholla fruit, desert tortoise, bighorn sheep, and other food items, are ubiquitous in the region. Evidence from excavations in eastern Clark County has revealed a long sequence of their utilization in this region. Data from the Virgin Peak area have yielded dates of 500 B.C. + 155, 450 B.C. + 80 and A.D. 595 + 70 (Ellis et al. 1982). Work in the Dry Lake and Muddy Peaks areas has yielded dates of 845 B.C. + 45 (Brooks and Larson 1975) and 1,355 B.C. + 125 (Ellis et al. 1982). Given the rich resources of the region, it would not be surprising if future work revealed use of these features in the study area during the Little Lake-Pinto-Gypsum Period.

The picture presented here is that of a transhumant settlement/subsistence pattern with a variety of environmental zones being exploited and a number of different site types being employed including rockshelters, temporary camps by springs, open lithic campsites, circular rock alignments, and roasting pits. This adaptation foreshadowed, at least partially, the Paiute pattern of subsistence gathering in the study area in the post-Puebloan era.

Puebloan Phase (2,000 to 850 B.P.)

This is the era referred to by Warren and Crabtree (n.d.) as the Saratoga Springs Period (A.D. 500 to 1,000), by Lyneis et al. (1978) as the Big Springs Period (2,300 to 800 B.P.), and by Shutler (1967) as four phases of Puebloan development; Moapa, Muddy River, Lost City, and Mesa House (2,300 to 800 B.P.). According to Warren and Crabtree (n.d.), "this is essentially the period of major Basketmaker III and Pueblo development and influence in the eastern Mojave Desert."

Two major explanations concerning the Puebloan or Anasazi presence in areas outside of their Muddy and Virgin River Valley homelands are generally in vogue at the moment. Warren and Crabtree (n.d.), noting the areal extent of Anasazi material in southern Nevada and the Mojave Desert, propose that Puebloan sites in this region, including the study area, represent "a more attenuated extension of the intermittent or seasonal foraging pattern" of the Gypsum Period. They infer that small parties of Anasazi from the Muddy/Virgin River area periodically foraged in the Las Vegas and Ash Meadow Valleys, and in the Sheep and Spring Mountains as well as the mountainous areas more immediately adjacent to the river valleys.

The other school of thought, exemplified by Lyneis (n.d., 1982a, 1982b) and this writer (Rafferty 1983d, 1983e), is that the Virgin Anasazi expanded and maintained permanent or semi-permanent settlements in the Las Vegas Valley and also maintained satellite stations for the extraction of turquoise in the Mojave Basin. This explanation will be discussed shortly.

The Virgin Anasazi represent a westward expansion of Puebloan culture into the upper reaches of the Mojave Desert along the Muddy and Virgin River Valleys of eastern Clark County. It has generally been accepted that the Virgin Anasazi were agriculturalists who grew the corn, beans, and squash triad as their essential resource base although this has not yet been proven. It is very likely that they exploited a number of wild resources including opuntia, agave, pinyon, juniper, and mesquite and there is evidence for their exploitation of these flora (see Brooks, York, and Massey 1972; Ellis et al. 1982; Bergin et al. 1980). The cultivation of wild or semi-wild flora including amaranths, chenopodia, and sunflowers is also a possibility (Shutler 1961; Soule 1979; Lyneis 1982b). Puebloan sites and ceramics have been found in Nevada as far west as the Nuclear Test Site in Nye County (Bergin and Roske 1978; Bergin et al. 1979), in the mountains of eastern Clark County (Ellis et al. 1982; Brooks and Larson 1975), and in the Las Vegas Valley (Lyneis et al. 1978; Lyneis n.d., 1982a; Rafferty 1983d). Pottery has been found in a variety of ecological zones and often in association with roasting pits. The total range of ceramic types reveals a sequence ranging from Basketmaker III through Pueblo III although this sequence is not present in total at all of the sites (Rafferty 1983d).

What is the evidence for permanent or semipermanent Anasazi occupation of the Las Vegas Valley? Three sites in the study area offer evidence of settled village occupation and a fourth may provide additional evidence. The first site is associated with Big Springs located in the Las Vegas

urban area, originally the source of the historic Las Vegas Creek. According to Lyneis et al. (1978:15-17), the site was excavated in 1937 by W.S. Park and the data, recorded on catalogue cards, was stored along with the artifacts at the Lost City Museum at Overton. According to the data, five rooms with evident walls existed in 1937. Four of the five were circular with diameters ranging in size from 8.25 to 12.33 feet. The shape of the fifth room is not mentioned. In Room 4, there is evidence of living floor superimposition indicative of two periods of use. The upper, later floor had several sherds of plain gray Lost City pottery on its surface.

Based on the sparseness of pottery and the circular nature of the rooms, Lyneis suggested that a Muddy River Phase (A.D. 500 to 700) occupation might have been possible. However, she does allow that a Lost City Phase occupation (A.D. 700 to 1,100) is also possible. Pithouse villages of circular rooms, ranging in size from four to 41 rooms, are known from the Lost City phase in the Muddy River Valley (Shutler 1961:15). Also, Warren's 1972 excavations at Big Springs (Warren et al. n.d.) recovered pottery ranging from Basketmaker III through Late Pueblo II (A.D. 900 to 1,100) in time. Therefore, Lost City occupation is far from out of the question. The question as to the date of the village may never be answered due to its destruction by the Las Vegas Valley Water District in the late 1960s. Warren's excavations did reveal that substantial data was left at the site along the old Las Vegas Creek including a midden deposit up to 18 inches deep. There may still be Puebloan structures at this site yet to be uncovered by a detailed program of survey and excavation.

The second site has even less data than the first. R.F. Perkins of the Lost City Museum informed Lyneis (n.d.:8) of the earlier presence of a Puebloan structure at Corn Creek near a short, spring-fed stream. Unfortunately, no records remain of the structure which no longer exists. However, as Lyneis points out, Williams and Orlins (1963:42-43) recovered Virgin Anasazi pottery in the Corn Creek Dunes area ranging from Basketmaker III to late Pueblo II-early Pueblo III times adding some credence to the claim.

The third site, recorded by UNLV in 1977 (Brooks et al. 1977b), is situated on the bench overlooking Pine Creek in the RRCRL. This site may have been a semi-permanent or permanent village. The entire site, one-quarter mile long by 100 yards wide, sits on an alluvial bench overlooking Pine Creek and the rich opuntia and pinyon colonies found there. The site contained a large scatter of lithics, milling equipment, two roasting pits, at least one house area, and other aligned rock walls. Also recovered were six varieties of Anasazi ceramics found within a large midden. It remains a possibility that this site was minimally a semi-permanent Anasazi site used for the procurement of cholla and other wild floral and faunal resources found within the Pine Creek/RRCRL areas.

The fourth site is also within the RRCRL one and one-half miles north of Pine Creek on the alluvial bench overlooking Ice Box Canyon Wash. The UNLV archeological field class recorded a half dozen or more features that were described as pithouses. This identification is by no means secure and may in fact, be erroneous. Other data such as ceramic types

and frequencies or point styles are not recorded on the site inventory record sheets. Thus, an assured identification of the site as being Virgin Anasazi is not possible. If it is an Anasazi pithouse village, the site may represent a semipermanent village established to procure sheep, deer, pinyon, or agave.

In addition to these "villages", there is ample evidence of Virgin Anasazi use of the valley on a temporary or seasonal basis. Many campsites exist along the escarpments, near springs, and along the Duck Creek area in Paradise Valley. One such campsite is the Twin Mound Site (also known as the Grey Mounds or Twin Dunes Site), a campsite situated on and around a mesquite-dominated dune complex. This site contains late black-on-white and redware ceramics, plainwares, groundstone, projectile points, and tortoise bone (Lyneis et al. 1979:47-49; Brennan, personal communication, 1983). Additional Anasazi campsites on the valley floor include 26 CK 1333 in the Corn Creek Dunes/Tule Springs area (Williams and Orlins 1963; King 1978) and in the Las Vegas Wash area (Ferraro 1975, 1980, 1982).

Puebloan occupation and/or use of the RRCRL/Spring Mountains area has also been extensively documented. In the RRCRL, Puebloan sites and ceramics have been recorded at a number of localities such as the Red Springs, Willow Springs, and Lost Creek archeological complexes; Lone Grapevine and Scrub Oak Springs; and a number of other localities (Brooks et al. 1974, 1976, 1977a, 1977b; Cunningham 1978). The major rockshelters mentioned earlier in this paper (Bird Springs, the RJK Site, Mule Springs, and Lennie's Site) all contain numerous Puebloan artifacts as do many localities in the Spring Mountains (Brooks, York, and Massey 1972). Finally, there seems to be a major concentration of Puebloan petroglyphs and pictographs associated with numerous roasting pits and two rockshelters in the Brownstone Canyon area of the RRCRL. Due to the number, size, and complexity of the motifs found there, several researchers have suggested that Brownstone Canyon may have served as a ceremonial center as well as an exploitation zone (Shutler and Shutler 1962; Brooks et al. 1977a; Rafferty and Rolf 1981; Rafferty 1982d).

Although the rich resources of Las Vegas Valley and nearby Spring Mountains would have prompted the Anasazi to have sent expeditions to the region to gather wild floral and faunal resources, what would have prompted a permanent or semi-permanent Anasazi presence in the Las Vegas Valley?

One major reason would have been population expansion and resource pressure due to population growth during the Lost City Phase. Shutler (1961) notes that by far, the largest number of Virgin Anasazi sites in the Muddy/Virgin River area date to the Lost City Phase, many more than the previous Muddy River Phase. A major expansion of population occurred at this time, one that very likely would have taxed the resource base of the river valleys. Boserup (1965) has argued that population, acting as an independent variable, will cause a society to shift into different, more intensive forms of subsistence. However, since agriculture is more labor intensive than hunting and gathering, and certain forms of agriculture (irrigation agriculture and creation of other water control devices) are even more labor intensive, a society will attempt other

strategies prior to intensifying their agricultural practices. Such strategies include moving to new locations, exploitation of alternative resources, and other, less labor intensive strategies (Glassow 1977, 1980).

Therefore, it is likely that early in the Lost City Phase, population growth may have been one spur to a Virgin Anasazi movement into the Las Vegas Valley. Mesquite and water resources of the valley area and wild floral and faunal resources of the Spring Mountains would be important sources of subsistence for sedentary populations in the region. In addition, limited agriculture was also possible in the valley. Early Euroamerican colonists and travelers report that the Paiute grew fields of corn, beans, and squash along the Las Vegas oasis and at Cottonwood Springs in the southwestern part of the study area (Lyle 1872:89; Lockwood 1872:75). Thus, by inference, it is very likely that the Anasazi, a sophisticated agricultural people, could have matched and exceeded any effort by the Paiute in the agricultural realm in Las Vegas. Thus, cultivated crops, mesquite, and other wild resources would have provided the Anasazi with an excellent living in the Las Vegas area.

A second, and perhaps more serious, inducement to Virgin Anasazi expansion may have been expansion towards rare resource zones in order to facilitate their procurement. It has been suggested that the Lost City Phase Anasazi were organized into sociopolitical systems known as "big man" systems (Larson 1983) or "chiefdoms" (Rafferty 1983c). Peebles and Kus (1977) have suggested five sets of archeological expectations that should accompany archeological chiefdoms and evidence of participation in and/or management of supra-local activities such as long distance trade is one of the main archeological expectations. Rafferty (1983e) has suggested that the Lost City Phase Anasazi were directly involved in the Pan-Southwestern trading system which in turn was integrated into the Mesoamerican "World System" of political and economic relationships (Wallerstein 1974; Weigand, Harbottle, and Sayre 1977; Pailes and Whitecotton 1979). Lyneis (1982b) believes that the Lost City Site at the juncture of the Virgin and Muddy River Valleys may have been a "port-of-trade" that served as a bulking and trading area for various exotic and vital resources. There is evidence, in the form of ceramics and hand axes, that a Virgin Anasazi presence existed at the turquoise mines at Halloran Springs in California (Rogers 1939), the Crescent Peak turquoise source in southern Nevada near Searchlight, and at the Sullivan turquoise mines in the Lake Mead National Recreation Area (Ellis and Bergin 1981). The Las Vegas settlements would have been perfect bases of operation for mounting expeditions to the turquoise mines for extraction, bulking, and transporting the turquoise back to the Lost City Site where it would be processed and traded south and east into the Pan-Southwestern system.

The Las Vegas sites may have also served as way stations on trade routes to the Gulf of California and the California Pacific coast. Fairly large quantities of shell from these areas have been found in Lost City Phase sites. In return, the Virgin Anasazi would have traded salt, selenite, and perhaps cotton westward as suggested by Lyneis (1982b). Thus, the valley springs would serve as water sources for agricultural purposes at settlements and as way stations on the trade routes running

north and south. A similar situation prevailed in the mid-1800's when Las Vegas was a welcomed watering station on the Old Spanish Trail that ran between Santa Fe and southern California (Hauck et al. 1979; Paher 1971).

Las Vegas may have been a resting stop between the Halloran Springs and Crescent Peak turquoise sources for the actual transporters of the goods. However, the mining operations themselves would have very likely been self sufficient. Small Puebloan sites in the Amargosa Desert near Halloran Springs were located in areas most suited for agriculture if conditions were correct and where large mesquite groves stood in historic times (Warren 1980:50-55). Thus, Las Vegas was a lynchpin in a much more complex system of resource extraction, transport, and preparation or trade that encompassed the chiefdoms of the Virgin Anasazi and connected into the Pan-Southwestern trade system and the Mesoamerican "World System".

After the Lost City Phase (A.D. 700 to 1100), the Virgin Anasazi underwent major cultural and environmental stress. By A.D. 1150, or the end of the Mesa House Phase, the Virgin Anasazi had abandoned the region and had probably migrated eastward into the Kayenta area of Arizona and Utah. Suggested factors causing stress and abandonment range from environmental dislocations (Larson 1983) to an invasion by the Paiute that forced the Anasazi out of the region (Hauck et al. 1979:58-60). However, it is likely that the abandonment is directly tied to the disruption of the Mesoamerican "World System" in the 12th century. As disruptions occurred in the Mesoamerican system (i.e. the disruption and fall of the Toltec Empire around A.D. 1168), concurrent changes occurred in the Southwest. In New Mexico, Chaco Canyon, a northern arm of this system, suffered severe depopulation and was subsequently abandoned by the early 1200s (Pailles and Whitecotton 1979). This decline is roughly coincidental with the collapse of the Virgin Anasazi who were deeply involved in the turquoise trade operating out of Chaco Canyon. With the collapse of Chaco Canyon and the Toltec Empire, much of the economic underpinning of the Virgin Anasazi society collapsed with it.

Evidence for Anasazi use of the study area is sparse for this phase. Some Anasazi pottery dating from the Mesa House Phase occurs at Bird Springs (Ancient Enterprises 1980), the RJK Site (Rodriguez and Rodriguez n.d.), Mule Springs Rockshelter (Turner 1978), Lennie's Site (Brooks, York, and Massey 1972), Lone Grapevine and Scrub Oak Springs (Cunningham 1978), and from several other sites in the area. However, the total number of sites is quite small and represents a very small and restricted Virgin Anasazi presence in the area, perhaps as expeditions for gathering wild food resources. However, by the end of the Mesa House Phase, the Anasazi had abandoned the study area as well as the Virgin and Muddy River Valleys.

Protohistoric Phase (950 B. P. to 200 B. P.)

This is one of the more confusing periods in the study area; many questions need to be answered concerning the presence of Paiutes and Lower Colorado peoples in the region and their relationships to the end of the Anasazi era. The date of the Paiute entrance into southern Nevada has been the subject of considerable debate. Based on glottochronological evidence,

Lamb (1958) has suggested that the Paiute expanded out of California into the southern Great Basin somewhere around A.D. 1,000 (Bettinger and Baumhoff 1982). Based on the best evidence, it seems obvious that the Paiute were present at least by the Mesa House Phase of the Virgin sequence. Shutler (1961) reports Paiute brownware ceramics from most of the Mesa House Phase sites and from many Lost City Phase sites as well. He also described a Lost City Phase burial that contained both a Paiute brownware jar and an Anasazi bowl.

Evidence of mixture comes from several rockshelters north of the study area, most significantly Paiute Cave (Harrington et al. 1930), Stuart Rockshelter (Shutler, Shutler, and Griffith 1960), and O'Malley and Conway Rockshelters in Lincoln County (Fowler et al. 1973). Additional evidence from the Las Vegas Valley comes from the Berger Site in Paradise Valley where Crabtree reportedly found Paiute ceramics with painted Puebloan designs (Hauck et al. 1979: 62).

However, a contrary line of evidence places the proto-Numic (Paiute) peoples in the Great Basin at a much earlier date. Goss (1977) suggests that the linguistic evidence places the proto-Numic peoples in the Great Basin by 2,000 B.C. attaining their historic distribution by A.D. 1,000. Aikens and Witherspoon (1982) have suggested that the protohistoric Paiute and Shoshone represent the latest cultural manifestation of an occupation of the central Nevada region extending over the last 5,000 years. They believe that the Numic expansion to the fringes of the Great Basin occurred after the more "advanced" Anasazi, Fremont, and Lovelock cultures abandoned the basin margins in the mid-12th century. Aikens cites Thomas' results in the Reese River Valley (1973, 1974) as being indicative of a Numic-type settlement pattern recognizable up until recent times. They argue for expansion of an occupation continuum rather than an explosive movement of peoples out of the southern California area deserts.

In any case, the Paiute were the occupants of the study area at the time of Anglo contact. The general picture of the Paiute, first suggested by Steward (1938), is that of a seasonally transhumant people moving to areas of seasonally available resources with temporary habitations being located in a variety of ecological zones (Larson 1978). Steward also mentions that the Paiute practiced limited corn, bean, and squash horticulture in Pahrump and the Las Vegas Valley. There is historic depth to this horticulture. Stoffle and Dobyns (1982) cite a number of early historic travelers (i.e. Armijo, Pratt, Escalante in 1776, Lyle and Lockwood) who discussed the presence of Paiute horticulture. In fact, Stoffle and Dobyns suggest that the Paiute were at least semi-sedentary farmers who grew fairly large fields of maize, chenopods, amaranths, and later on, wheat. It is most likely that the Paiute developed horticulture from their contact with the Anasazi. Fowler and Fowler (1981:133) cite weak archeological evidence for Paiute horticulture by A.D. 900 or 1,000, but note that this evidence is quite tenuous.

Archeological evidence for a Paiute presence in the Las Vegas region is extensive. All of the rockshelters previously mentioned (Bird Springs, Mule Springs, the RJK Site, and Lennie's Site) contained a Paiute component in the form of ceramics and/or projectile points. Surveys in the Spring

Mountains (Brooks, York, and Massey 1972) and in the RRCRL area (Brooks et al. 1976, 1977a, 1977b) have recorded Paiute ceramics and projectile points at many sites (see also Cunningham 1978; Larson 1978). Fowler and Fowler (1981:143, Map 2) cite evidence of over 20 sites in the Las Vegas Valley containing Paiute material and Ferraro (1975, 1980, 1982) recorded post-Anasazi occupation of the Las Vegas Wash area. A variety of different site types were employed including open camps near springs or seeps, rock shelters, rock circles that may have been brush shelter bases, brush shelters, roasting pits, hunting blinds, and a variety of other site types. The study area was, for the Paiute as with earlier groups, an oasis in the Mojave Desert that provided assured sources of water and food.

Contact with Anglo travelers in the early 1800s and disruption of their traditional lifestyle by Anglo farmers and cattlemen in the mid-to-late 1800s destroyed their culture and way of life. Several small reservations were created for the Paiute in the 1870s where the majority of them now reside.

Lower Colorado groups also apparently exploited the Las Vegas Valley resource base, but seemingly did so on a seasonal basis with less intensity than did the Anasazi or the Paiute. Lower Colorado buffware ceramics have been recovered in the four major rockshelters mentioned earlier and in all of the other locations that have been discussed. Often these ceramic types are intermixed with Paiute and sometimes Puebloan ceramics and artifacts. They were attracted to the same resources that attracted the other culture groups to the Las Vegas Valley and the Spring Mountains. However, their exploitation was probably on an expedition basis since they were primarily agriculturalists who resided full-time on the floodplains of the Colorado River.

Lower Colorado peoples utilized the same variety of site locations that the Paiute employed and often the exact same locations. Two sites are most representative of Paiute/Lower Colorado use of the region, the Basic Site (Brooks and Larson 1975) and the Berger Site (Crabtree, personal communication, 1982). There are many other sites with a dual occupation represented at them as well.

The Basic Site is on the western slope of the River Mountain Range on the extreme eastern edge of the study area. It is a rock overhang in an outcropping of volcanic basalt which overlooks an arroyo almost due south of its opening. The nearest water was at the Las Vegas Wash complex situated several miles north and the springs in the Whitney Mesa/Paradise Valley area two miles to the west. The shelter is fairly large measuring eight meters wide by one and one-half meters high and four meters deep with a midden in front measuring nine meters by ten meters.

The site was excavated using two initial exploratory trenches. This was followed by an extensive excavation of the majority of the shelter interior and part of the midden. The midden was excavated to a depth of 60 centimeters. The majority of the artifactual material was recovered above the 40 centimeter level. This material included 31 projectile points (sixteen typable), 361 sherds, olivella shell beads, and over 32,000

flakes (waste, utilized, and worked) derived from local quarry materials. There is some confusion as to the juxtaposition of the projectile points in the excavation. In the top 10 centimeters were found a Humbolt point, a Gypsum Point, and an Elko-eared point which can date back to as early as 2,000 B. C. or earlier (Hester 1973; Fowler et al. 1973). Also recovered in the first level were seven Rose Spring and Eastgate points dating from roughly A.D. 600 to 1,700. Three explanations for this mixing of point types present themselves: (1) disturbance of the shelter by vandals; (2) reuse of earlier projectile points by later groups that found them in the area, or; (3) a complex internal stratigraphy that was not identified during excavation.

It is the ceramic frequencies and the lone radiocarbon date that establish the base date and cultural affiliations for the shelter. A very small percentage of the ceramics (1 percent) in the 0-10 centimeter to the 20-30 centimeter levels, were Puebloan. From the 20-30 centimeter level to the surface, roughly 10 percent of the total sherds were Paiute brownwares. However, Brooks and Larson (1975) believe that the early occurrence of this material may mean that it is actually an early lower Colorado utility ware called Tizon Brown since buffwares make up 76 percent of the total sherd count from the site beginning in the 40-50 centimeter level. Also, from the 40-50 centimeter level came material radiocarbon dated at A. D. 705 ± 145 corresponding with Schroeder's (1958) suggestion that Lower Colorado gray-brown pottery has a pre-A.D. 800 commencement date. One additional piece of evidence confirming the occupation of this site by Lower Colorado peoples is the presence of olivella beads from the 30-40 centimeter level upward which tends to be associated with Lower Colorado peoples.

Thus, it seems that the Lower Colorado peoples may have been in the study area even prior to the Paiute and contemporaneously with the Pueblo. These forays may not only have been for subsistence purposes, but for trade. The Colorado River may have been one branch of the Pan-Southwestern trading system as it flowed through the Las Vegas Valley providing Gulf of California shells for various trade goods from the Pueblo (perhaps salt, selenite, cotton, and/or turquoise). More research is needed to examine this proposition.

The other site is the Berger site (Crabtree, personal communication, 1982) which is located along Duck Creek in the Paradise Valley area of Las Vegas. This was a small campsite, 50 by 80 by 5 feet deep, located in a former mesquite grove that was situated along a riparian area on Duck Creek which flowed permanently until 1957 or 1958. Despite its small size, this site contains a considerable amount of data concerning subsistence patterns and possible cultural contact between three culture groups, the Anasazi, Paiute, and Lower Colorado.

In general terms, the Berger site contained 30 to 35 hearths, but no other features, structures, or living floors. The most common artifactual remains were ceramics, mostly Paiute. Roughly 15 percent of the ceramics associated with the site were Lower Colorado buffwares, while 5 to 10 percent were late Lost City corrugated styles and late Anasazi tradewares such as Verde Black-on-Grey, Tsegi Orange, and San Juan Black-on-Red.

There appeared to be contact between the three groups during the late Lost City or Mesa House Phases, perhaps indicative of some kind of trading relationship. In addition, Hauck et al. (1979:62) state that some of the Paiute sherds at the Berger Site had Anasazi ceramic motifs.

This cultural mixture or contact is also suggested by the mixture of projectile points at the site. Rose Spring and Eastgate points were found mixed with Cottonwood triangular and Desert Side Notched points. The former Crabtree considers to have been essentially related to the Anasazi while the latter he believes to be basically Paiute in association.

The procurement of wild floral and faunal resources was apparently the main purpose of this camp. Crabtree reports 200 to 300 groundstone items from the site including four complete basin metates, a bedrock mortar, a number of complete manos, and dozens of mano fragments. Also recovered were grape seeds and a number of unidentified seeds in the site midden. Bone recovered included many tortoise fragments, a variety of local avifauna and waterfowl, and the remains of jackrabbit.

Crabtree suspects that the Berger Site was the scene of short term occupations recurrent over many years time. Desert tortoise is known to exist with a density of 19 to 58 per square kilometer in the study area at Arden (Karl 1980:43) and probably existed in heavier numbers in the prehistoric past. They are most active in spring and fall, particularly in the fall when moving to winter dens (Coombs 1974:450). Mesquite also usually becomes ripe in late summer or early fall so it is quite likely that fall was a prime occupation time for the Berger Site.

There are also a number of sites in the study area that contain only Lower Colorado buffwares, perhaps indicating a more permanent occupation by the Lower Colorado peoples than on just a seasonal basis. This is a point that needs to be pursued by future research (Blair, personal communication, 1982).

It is unknown whether the groups occupied the sites at the same time, in different seasons, or if the mixture of materials was a result of trade contacts. Any or all of these alternatives could be possible for any site with similar artifactual components. However, by the time of the entry of white non-aborigines into the study area, the Southern Paiute were the major aboriginal group occupying the study area. Their lifeways have been touched upon earlier in this section. Euro-American contact in the 1800s completely changed their lifeways and destroyed the basis of their culture, as will be briefly discussed below.

Historic Phase (200 B.P. to Present)

The history of the study area is fairly well known and will only be touched upon here. The Historic Period with begins the entry of explorers from Spain, Mexico, and the United States who kept written records of their observations (see Paher 1971 for a detailed history of Las Vegas).

The earliest explorers of the region were Father Garces in 1771 and the Dominguez-Escalante Expedition of 1776-1777. Both explorations had the purpose of finding an acceptable route between Santa Fe and the southern

California missions. Although neither entered the study area, or even Nevada, they did contact peoples who ranged through the study area (Paher 1971:12; Hauck et al. 1979:80-81).

Following the Padres, Antonio Armijo was the first non-Indian to actually enter Las Vegas Valley. Actually, one of his scouts, Rafael Rivera, first discovered Las Vegas and Cottonwood Springs in 1829 thereby completing the Old Spanish Trail by extending it through Las Vegas Valley. Previously, others including Jedediah Smith and Peter Ogden had established the trail along the Virgin River and down the Colorado River. The newer route was 40 miles shorter and more direct. Thus, it became a primary route of commerce until the Mexican War in 1848 (Paher 1971:14; Hauck et al. 1979:81-84).

John C. Fremont traveled through the study area in 1844 from California making topographic observations along the Old Spanish Trail as he went. Following Fremont, the trail was used: (1) by immigrant parties on their way to California who used Las Vegas as a major water spot; (2) as a mail run established in 1854 from Salt Lake City to southern California; and (3) by Mormon settlers in California using the trail to ship merchandise to Salt Lake City (Paher 1971:16-18). The trail still exists in some portions of the study area and is marked by concrete obelisks identifying it as such. Unfortunately, much of the trail has been destroyed by construction and the rapid expansion of the Las Vegas urban area.

Inevitably, the colonizing effort taking place by the Mormons in the desert west was bound to reach Las Vegas. Bishop William Bringham was sent in 1855 from Salt Lake City to establish a mission and settlement in Las Vegas Valley and to commence the proselytizing of the local Paiute. They built an adobe fort for protection against predation by Indians, cleared and planted fields along the Las Vegas Creek, and began exploring for and smelting lead deposits at Mount Potosi southwest of the study area. Dissension between the original colonists and later lead miners sent from Salt Lake City led to the abandonment of the Las Vegas Mission in 1857 (Hauck et al. 1979)

After the abandonment of the mission, Octavius Gass purchased the fort and water rights in 1865 and turned it into a ranch. Gass conveyed the ranch to Archibald Stewart in 1881 to repay a loan. Helen Stewart, Archibald's widow, operated the ranch until 1903 when she sold it to William A. Clark who auctioned off plots of land to settlers in order to establish a stop for the San Pedro, Los Angeles, and Salt Lake Railroad (Hauck et al. 1979:91). The Mormon Fort still exists as a historic monument and was recently restored and reopened in 1982.

Other ranches existed in the early historic Las Vegas Valley. Carpenter (1915:Plates I and II) notes 13 ranches in Las Vegas Valley including the Stewart Ranch and the Kyle Ranch (which still exists today in a deteriorated state). In the RRCRL area, Wilson's Ranch (the modern Spring Mountain State Park) was built around 1880 (Paher 1971:62) and was owned by a succession of famous individuals; Chet Lauck of "Lum and Abner" radio fame, Vera Krupp of the German munitions family, and Howard Hughes. The Bishop Ranch in Las Vegas Wash was settled in the early 1900s and

abandoned a few years later (Ferraro 1975, 1982; Hauck et al. 1979:96). There were several other ranches in the eastern part of Las Vegas Valley all of which are now gone.

Mining activity also had an impact on early Las Vegas. The Potosi mines, abandoned by the Mormons in 1857, underwent a mild boom for silver between 1861 and 1863, but were quickly abandoned and never reopened (Hauck et al. 1979:103). Other formerly active mines in the study area include the Frenchman Mine on the southwestern end of Frenchman Mountain which opened in 1905 and closed in 1914 (Ellis 1982), the Lucky Strike Mine on the slopes of the Spring Mountains which operated from 1906 to 1907 (Ellis 1983b), and the Quo Vadis Mine in the southern portion of the study area which dates to 1915 (Brooks et al. 1977c). Finally, the Gass Peak Mining District on the southern and eastern slopes of Gass Peak, 14 miles north of the Las Vegas urban area, existed as an ongoing, but low level, operation. The June Bug Mine was this district's primary producer (Longwell et al. 1965).

It was the building of Hoover Dam and the concurrent liberalization of the gaming laws in the 1930s that set the stage for the growth of Las Vegas. The post-World War II era saw the development of the first of the major hotel-casinos, a trend which has continued to the present day. Presently, Las Vegas has an estimated population of 450,000 and more growth is projected for the future. Tourism and gambling have made Las Vegas an internationally famous resort and provide livelihoods for the majority of its residents. This is a far cry from the sparse occupations of the study area in prehistoric times and even during the early and mid-twentieth century. Construction and expansion have altered the natural environment to such a degree that it has vanished in most parts of the study area. They have also had a tremendous impact on the condition and very existence of the cultural resources that still exist in the valley.

CONDITION OF THE LAS VEGAS VALLEY CULTURAL RESOURCES

As part of the overview effort, the available site inventory records were compiled and reviewed in a cursory fashion for adequacy and accuracy. An ongoing effort to coordinate site records and report records between the BLM and UNLV has contributed mightily to this effort. Data on the site forms varies in quality. The earlier site records (pre-1970) are of generally poor quality containing little data aside from basic site location and perhaps an explanation of the type of site (i.e. campsite, rockshelter, lithic scatter). The post-1970 site records are generally of much better quality containing detailed site data including site dimensions, artifact type and cultural affiliations, features, sketch maps, and detailed environmental data.

An additional problem with the site records is that, aside from the Red Rock Canyon Class II sample surveys (Brooks et al. 1977a, 1977b), there has been no systematic survey of the study area. Archeological surveys are conducted when project specific needs arise (i.e. the granting of right-of-way, a land sale or transfer, the construction of a housing tract). Consequently, there is no statistically reliable sample of the sites that existed in the study area and one probably can never be constructed or reliably estimated.

Given these caveats, the following data is available from the site records of the Las Vegas District for the study area. A total of 380 archeological or historical sites are recorded for the study area which can be divided into 12 categories or site types (Table 2).

Table 2. Recorded Sites in the Las Vegas Valley Study Unit

<u>Site Type</u>	<u>Number</u>
Isolated Artifacts	26
Lithic/Sheard Scatters.	84
Rockshelters/Overhangs	66
Roasting Pits.	39
Campsites.	57
Pithouse "Villages".	5
Quarries	4
Petroglyph Loci.	12
Pictograph Loci.	1
Rock Rings/"House Outlines".	31
Sites with 2 or more features noted above.	24
Historic	31
TOTAL	<u>380</u>

The majority of these sites are located at or near permanent or extinct water sources such as springs, Duck and Las Vegas Creeks, Las Vegas Wash, or along escarpments where water is available in the form of seeps. Many of the site records do not identify the cultural affiliation or estimated age of the sites. Many are very likely multicomponent with artifactual remains of more than one cultural group spanning a large chronological period.

Damage to the majority of these sites has been severe and comes from several quarters, both historic and ongoing. Four major sources of early (late 1800s to early 1900s) impacts to cultural resources can be identified:

1. Farming - After the advent of the railroad in 1905, farming became a major economic pursuit for early Las Vegas. Many of the early ranches and farms were built near springs in the Las Vegas Creek/ Duck Creek area and fields were planted where water was available. Paher (1971: 58, 60-61) shows pictures of the early farming operations at the Kyle and Stewart Ranches which necessarily impacted prehistoric sites situated around the same waters that would have attracted the aboriginal inhabitants.
2. Town expansion - The two early sites of the City of Las Vegas, Clark's Township and McWilliam's Township, were constructed near or along the Las Vegas Creek. Paher describes the construction methods at Clark's Township by noting "the land had been leveled by a heavy railroad iron weight ninety pounds to the foot, hitched up to an eight horse team. The iron uprooted most of the Indian cabbage, sage, wildflowers and stubborn evergreen growth, though a gang of workers had to dig up mesquite and small trees" (1971:77,79: emphasis added). This most certainly destroyed archeological sites that were located along the creek in the mesquite forest.

3. Mining - Mines were established in various locations as noted earlier, one of which was located at Sandstone Quarry in Red Rock Canyon. This quarry was in an area of rich cultural resources and some sites were very likely damaged and destroyed. Other mines located near water sources almost certainly had an impact on the cultural resources in the areas around the mines.
4. Collecting, Vandalism, and Pothunting - Even in the earlier historic period vandalism and pothunting damaged archeological sites. Helen Stewart carved her initials in or near a rockshelter in the Red Rock Canyon area at Wilson's Ranch and W.S. Park was responsible for the excavations at Big Springs in the 1930s. It is almost certain that further collecting, excavation, and vandalism occurred during this period.

Since the 1940s, the rate of impacts has accelerated with the expansion of the Las Vegas urban area and a massive population increase. The following impacts to cultural resources can be identified:

1. Urban expansion - Las Vegas is now a city of 450,000 and has expanded to hundreds of times its original size. This expansion has filled in the Las Vegas Creek, leveled many of the original spring mounds, and otherwise resulted in surface disturbance throughout the Paradise Valley/Duck Creek area.

Most of the original mesquite forest has been destroyed. Many of the campsites along Duck Creek that were recorded in the early 1970s are now gone, destroyed by the expansion of housing and businesses in the study area. With the urban expansion has come concurrent industrial expansion, mainly in the form of powerline corridors. The IPP powerline (Tucker 1982), the Navajo-McCullough powerline (Brooks and Larson 1975), and other small powerlines cut through the Las Vegas Wash area impacting a number of archeological sites in the wash area. It is suspected that these impacts will continue and accelerate in the next decade.

2. Governmental Projects and Development - Projects undertaken by the Federal Government have created impacts to the cultural resource base of the study area, both positive and negative. In the 1930s, the Civilian Conservation Corps built two sheep guzzlers/dams in Brownstone Canyon, both of which were adjacent to roasting pits. These most surely impacted the roasting pits and served to call these resources to the attention of other members of the general populace. In addition, old BLM water improvement records indicate that many of the springs in the Red Rock Canyon area, then (the 1950s) called the Sandstone Unit, had been subjected to Bureau spring improvement projects. These springs include Willow Springs, Oak Creek, La Madre Springs, Ash Creek, Red Rock Spring, White Rock Spring, Calico Spring, Lone Grapevine Spring, and several others. Damage was probably done to the archeological resources in the areas around these springs although an assessment of the potential damage is impossible. One site on the National Register impacted by a Federal project is the Sloan Petroglyph site which was impacted by guzzler construction.

Development of the Red Rock Canyon area for recreation has created considerable damage to the Willow Springs archeological complex (Brooks et al. 1976). When recreation facilities were constructed there in the late 1960s, several of the roasting pits suffered severe damage. Two picnic tables each were constructed on top of two roasting pits, a toilet was constructed on top of another, and an early access road was bladed through another roasting pit at the mouth of the springs area and through a pit near La Madre Springs, north of Willow Springs.

Lands actions conducted by the BLM have also very likely precipitated damage to cultural resources in the study area. Land sales have been conducted in the Las Vegas urban area since the 1950s and it is likely that sites were on parcels that were sold. Bureau authorized activities carried out by other agencies have also caused damage to cultural resources. For example, the City of North Las Vegas will be building a flood control basin in the lower part of Las Vegas Wash. An archeological survey of the area (Ellis and Brennan 1982) recorded five small sites which were documented and collected. Thus, some data concerning that portion of the study area was collected, but the remnants of these sites and their environmental context have been destroyed.

The withdrawal of the Nellis Air Force Bombing and Gunnery Range has also affected the cultural resources of the study area. Much of the area north of Las Vegas Wash in the Gass Peak area has been withdrawn by the Air Force for their own purposes. This has had mixed effects. Closing off the bombing range has probably reduced the amount of vandalism and pothunting that could have otherwise taken place in the nearly 40 years since it was withdrawn. However, according to Bergin et al. (1979:140), pilots have often bombed or strafed historic sites as "targets of opportunity" to expend their ordinance destroying the historic mining towns and camps that exist on the range. The limited access to the range and the existence of unexploded ordinance has also eliminated legitimate archeological research on the range preventing any assessment of the cultural history or settlement/subsistence patterns of the area. It is also fairly common knowledge that pothunting is a major hobby of maintenance crews on the range, but the impact of this activity cannot be assessed at the present time.

The same positive/negative impacts can be presented for the Desert National Wildlife Range withdrawal which begins north of Corn Creek Dunes and overlaps much of the Nellis Range in the study area. Restricted access into the area has curbed vandalism and pothunting as well as legitimate archeological research.

3. Recreational Impacts - The development of the Red Rock Canyon area as a recreation area has created impacts, mostly negative, on the cultural resources of the study unit. It is estimated that roughly 315,400 people visited the RRCRL area in 1979 (USDI, BLM 1980:92, Table 3-9) and it is certain that more have visited it each year since then, particularly with the opening of the Visitor's Center in early 1982. Recreation activities include picnicking, sightseeing,

hiking, climbing, and camping. Unfortunately, many of the major site complexes such as Red Springs and Willow Springs have received severe damage from trash being dumped, trampling, vandalism, pothunting, and just plain carelessness at the hands of some visitors. This reduces the data base for future research in this part of the study area.

Recreation in other parts of the study area have also resulted in impacts to the resource base. One major form of recreation in the area is the use of off-road vehicles (ORVs). Many site records in the area note ORV damage to archeological sites, particularly roasting pits. As in RRCRL, hikers and campers also present potential sources of damage through vandalism, collecting, trash dumping, and carelessness.

On the positive side, increased recreation has increased the potential for visitor education, particularly in the RRCRL area. Bureau employees have conducted numerous interpretive talks and environmental programs that discuss cultural resources and their value as part of the human environment. The University, through field classes, continuing education classes, and other outings, has also helped to educate the public concerning the value of cultural resources. These programs present the most effective means the Federal Government and the archeological community have to educate the public and reduce vandalism and pothunting.

4. Vandalism and Collecting - Although mentioned in passing in the other sections, vandalism by itself is a serious impact on archeological resources. Nickens et al. (1981) identify two major categories of vandalism, predatory and malicious. Of the former, they state that "this form of intentional activity is the most widespread and has the most serious consequences for cultural resources. It is characterized by a motive dictated by personal gain, and may be subdivided into non-commercial and commercial" (1981:24). Non-commercial activities include relic collecting, satisfying a curiosity, and "egocentric autographing of cultural resources" by spray painting or scratching one's name into a cultural resource (Nickens et al. 1981:24; see also Williams 1977 and Lyneis et al. 1980 for further discussions).

The commercial aspect is the deliberate excavation of archeological artifacts for sale and profit. This is a widespread and ongoing problem resulting in the destruction of hundreds, perhaps thousands, of archeological sites each year and is international in scope (see Adams 1971; Beals 1971; Clewlow et al. 1971; and Sheets 1973 for further discussions of the problem).

It is unknown whether commercial vandalism is taking place in the study area at the present time. Given the richness of the archeological resources in the Spring Mountain area, it is not an unlikely possibility. Other types of predatory vandism have and are occurring at the present time. Several prominent public figures in the Las Vegas area are known to have collections of artifacts from archeological sites situated on public lands and there are numerous sites that

have potholes in them within the study area and elsewhere within the Las Vegas District. Additionally, many site sheets from the study unit indicate damage from pothunting or vandalism.

Malicious vandalism is defined as "acts which may be classified as those brought about by revenge or frustration with governmental policies, or those which result from no discernible motive at all" (Chokhani 1979:10; Nickens et al. 1981: 25). Fortunately, according to the Nickens study, this sort of destruction is the least widespread in comparison to other types of vandalism and this seems to be true for the study area although it cannot be documented.

5. Archeological Vandalism - Although archeologists are supposedly stewards of the nation's prehistoric resources, some activities that have been conducted by archeologists can conceivably be classified as vandalism. It has to be admitted that every archeological undertaking results in a loss of certain amounts of data. Excavation involves the controlled destruction of an archeological site and although every effort is (or should be) made to collect a wide spectrum of data to deal with many problems, naturally some data will be lost. It is an inevitable process. However, if the intent of the excavation is just to dig to "see what's there," without any sense of research questions or goals, this is no better than pothunting unless a site is threatened with destruction. Even then, some sort of research question based orientation should be injected into the proceedings.

Other practices also lead to harmful impacts on cultural resources. According to Nickens et al. (1981:23), these include artifact collection without corresponding mapping of artifact loci and conducting work without undertaking the necessary artifact analysis and data reporting. Without analysis and reporting the results to the archeological community, this data is as good as destroyed. It has not advanced archeological knowledge. This negligence makes the practice little better than vandalism or pothunting.

Without appropriate measures taken to preserve archeological sites and to record and retrieve archeological information, we will know little more about Las Vegas Valley's prehistory than we do now. The next section discusses research problems that need to be examined and is followed by management options that can and should be considered by the Bureau of Land Management to allow future research into the prehistory and history of the study unit.

FUTURE RESEARCH QUESTIONS

There are a number of questions that need to be answered concerning the archeological/cultural resources of the study area. Each period of occupation in the valley has a different series of questions that should be addressed, so this section will be divided into phases. Some of the questions have been adapted from Lyneis's (1982b) overview in the Nevada Historic Preservation Plan and the draft addendum to that plan that is in preparation (Rusco 1983). Others are original to this document. Since exact citation is not attempted, the writer acknowledges the influence of these two documents and his debt for some of the research questions posed herein.

Tule Springs and San Dieguito Phases

- I. What was the floral makeup of Las Vegas Valley in this period?
- II. What was the nature of the Paleo-Indian occupation of the area?
 - a. Population size,
 - b. Site location,
 - c. Subsistence pattern - i.e. - Did Paleo-Indians use the surrounding mountain ranges as sources of additional wild floral and faunal resources, or just pursue big game and exploit lacustrine floral resources?
- III. Did Paleo-Indian peoples give rise to the San Dieguito Phase peoples that followed them into the region?
- IV. What was the nature of the San Dieguito occupation of the area?
 - a. See II. a, b, and c.
- V. What evidence is there for environmental change at this time and what was the exact nature of this change?
- VI. Is there evidence of an occupational hiatus that corresponds with Antevs' Altithermal Period, as claimed by Hauck et al. (1979)?

Little Lake-Pinto-Gypsum Phase

- I. What was the nature of the Archaic settlement in the study unit? What evidence is there that the inhabitants were:
 - a. Intrusive from the southern California area?
 - b. Perhaps intrusive from elsewhere?
 - c. An in situ development out of San Dieguito Phase?
 - d. Representative of two different culture groups - i.e. Pinto and Gypsum peoples?
- II. What was the settlement/subsistence pattern of Archaic groups in the study area?
 - a. Seasonally transhumant settlement/subsistence pattern?
 - b. Semi-permanent settlement in the valley area?
 - c. Evidence of roasting pit use in the area during this era?
- III. Where did the Archaic occupants go during the Puebloan intrusion?
 - a. Withdraw out of the valley?
 - b. Live simultaneously in the valley with the Pueblo?
- IV. What evidence is there for contact (i.e. trade) between Las Vegas Valley Archaic peoples and other Archaic groups surrounding the valley? Is there evidence of:

- a. Extra-local lithic materials (obsidians, cherts) in Archaic sites?
 - b. Shell beads from California or the Gulf of California?
 - c. Artifacts associated with culture groups other than Las Vegas Valley/southern Nevada Archaic groups?
- V. Is there evidence to link southern Nevada/Las Vegas Archaic groups to a proto-Numic concept or were Nevada and Numic groups different cultural entities?
- VI. Why do the Elko series points span this phase and continue on into the next?

Puebloan Phase

- I. What was the nature of the Puebloan occupation in the study unit?
- a. Earliest date of intrusion?
 - b. Permanent or semipermanent?
 - c. Sociopolitical organization of valley settlements?
 - d. Subsistence base
 - 1. Agricultural?
 - 2. Mixed agricultural/wild resources? Evidence for Puebloan use of roasting pits in the study area?
- II. What evidence is there for Virgin Anasazi involvement in the Pan-Southwestern trade system as seen from Las Vegas? Is there evidence in the study unit of:
- a. Turquoise from Halloran Springs, Crescent Peak, or Sullivan Turquoise Mines?
 - b. Shell from California or the Gulf of California?
 - c. Other non-local artifacts and materials such as ceramics, lithic sources, foodstuffs, or other manufactured non-Virgin artifacts?
- III. What was the relationship of the Las Vegas Valley Anasazi to:
- a. Early or Proto-Numic peoples?
 - b. Lower Colorado peoples?
- IV. When did the Virgin Anasazi abandon the Las Vegas Valley? Did they abandon the area completely or return on an expeditionary basis to collect wild flora and fauna from the region?

Protohistoric Phase

- I. When did the Paiute enter Las Vegas Valley?
- II. What was the nature of the Paiute settlement in the study unit?
- a. Seasonal occupation?
 - b. Semi-permanent settlements?
 - c. Permanent settlements?

- III. What was the nature of their subsistence base?
 - a. Completely hunting and gathering?
 - b. Horticulture as well as hunting and gathering in the prehistoric Paiute era? Is there evidence of roasting pit use?
 - c. To what degree was horticulture relied on?
- IV. What was the nature of the relationship between the Paiute and the Virgin Anasazi and Lower Colorado groups in the study area?
 - a. Trade relationship?
 - b. Living in the valley at different times of the year?
 - c. Living in the valley alongside the Virgin and Lower Colorado groups?
- V. Are there differences between the pre-Numic and Numic settlement/subsistence systems in their adaptation to the same environment?
- VI. Were the Paiute immigrants new to southern Nevada or already in place in Nevada and the Las Vegas Valley when the Virgin Anasazi withdrew from the study area?
- VII. Was the nature of the Lower Colorado occupation of the study unit?
 - a. Permanent?
 - b. Semi-permanent?
 - c. Seasonal visitation?
- VIII. What was the nature of the subsistence base?
 - a. See III. a., b., and c.
- IX. What was the nature of the relationship of the Lower Colorado peoples to the Paiute and Virgin Anasazi?
 - a. See IV. a., b., and c.

Historic Phase

- I. Was there a pre-1855 Mormon way station established near Las Vegas Springs? Paher (1971:276) mentions such a way station that was expanded by the Mormon Mission of 1855-1857.

Because the early history of Las Vegas is relatively brief and well documented, little further research in the study unit is considered necessary.

MANAGEMENT PROBLEMS AND RECOMMENDATIONS

As can be seen in the section on the condition of sites and potential impacts to them, the problems facing the BLM within the study unit are myriad. The most serious and immediate problems are listed below (adapted from Rusco 1983):

1. Inaccurately and incompletely recorded sites within the study unit.
2. Unrecorded sites in the study unit.
3. Sites threatened by urban expansion.
4. Sites threatened by the activities of governmental agencies.
5. Sites threatened by pothunting and vandalism.
6. Lack of a systematic, scientifically accurate, survey of archeological sites within the study unit.
7. Lack of explicit mitigative procedures to address sites about to be impacted.
8. Lack of funding and manpower to meet emergency situations involving destruction of archeological sites.
9. Lack of ordinances concerned with protection of cultural resources.
10. Lack of law enforcement capability.

The following procedures are recommended to begin alleviating these problems:

1. The BLM should commence to rerecord and evaluate all of the known sites under its jurisdiction in the study unit. Either BLM personnel or an entity contracted by the BLM should undertake this activity as soon as possible. Construction and urban expansion is a daily ongoing process and an accurate appraisal of such archeological resources under the BLM's management is essential before any further BLM permitted work is allowed to proceed in the Las Vegas Valley study unit.
2. The BLM should take the lead in encouraging other governmental agencies in the study unit such as the City of Las Vegas, the City of North Las Vegas, Clark County, the City of Henderson, Nellis Air Force Base, the U.S. Fish and Wildlife Service, and the State of Nevada to update and reevaluate already recorded archeological sites under their jurisdictions.
3. The BLM should initiate statistically sound sample surveys on all the lands under its jurisdiction in the study unit to acquire a statistically valid data base which can be used as a baseline for future planning. Other governmental agencies should be encouraged to join this effort in conjunction with the BLM so that all of the lands under any governmental jurisdiction can be included in the inventory.
4. A regional research design should be established for the Las Vegas Valley study unit delineating explicit research questions and procedures of data recovery and analysis for the pursuit of such questions.

Additional research questions should be accommodated by the design should new goals arise, but the bottom line of all research conducted in the study unit should be guided by this research design. This design should also outline minimal procedures for salvaging sites in imminent danger of destruction and spell out the data of importance.

5. Money and manpower problems can be alleviated by the BLM entering into a cooperative agreement with the Department of Anthropology at UNLV, the Environmental Research Center at UNLV, the Archaeo-Nevada Society, and other local entities to provide manpower and equipment for emergency salvage or mitigative procedures on BLM land. The BLM should be required to provide certain front monies for excavation overhead while other entities would be committed to providing manpower and time to such projects.
6. Students from the UNLV should be encouraged to conduct original research on BLM lands as the basis for M.A. theses or publishable works.
7. The BLM should begin a large public education effort centered in the RRCRL area, but not limited to it, to sensitize the public to cultural resources and their values. Such an effort should be coordinated with other State, local, Federal governmental and educational entities to avoid duplication of effort and ensure wide dissemination of such educational data.
8. Private landowners with archeological sites on their properties should be encouraged to make use of the newest changes in the Tax Code to establish archeological easements that would serve to protect cultural resources while providing the owners with substantial tax breaks.

It is quite likely that all of the potential problems and possible solutions to these problems have not been addressed in this section of the document. The intent of this section is to highlight the most prevalent problems and present various approaches to solving them. Each problem and each situation must be approached in two manners; as a localized single problem or situation and as part of a wider spread, ongoing situation occurring in the Las Vegas study unit. Such a two pronged attack, particularly the large scale portion, will go a long way towards beginning to solve some of the problems existing in the Las Vegas area.

CONCLUSIONS

This document has been written to serve as a basis for future research in the Las Vegas region, to begin to identify problems and threats to the cultural resource base, and to suggest some possible solutions and lines of attack. The reader will notice that the writer has some theoretical axes to grind, particularly in the Virgin Anasazi overview section, and that he has pushed some very scanty data to its logical (or beyond) limits. This is due to the writer's belief that an overview should not only discuss the accepted archeological viewpoint, but should present new ideas and possibilities wherever feasible. In this regard, I hope that I have not been remiss.

The Las Vegas area was not, and is not, an archeological wasteland, but a highly sensitive area where the answers to many questions concerning the prehistory of southern Nevada lie. The time to start preserving this data base has long since past and, as a result, much information has been destroyed inadvertantly or on purpose. However, concerted action now and in the near future can preserve what is left or at least allow us to take advantage of data threatened with destruction. It is hoped that this document will serve as a spur to others to begin the long and difficult task before it is too late and all we have are concrete and lost opportunities.

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APPENDIX I: THE SANTINI-BURTON LAND SALES

For several years archeologists working in the Las Vegas Valley have used an intuitive hypothesis when surveying in the creosote dominated portions of the valley; they anticipate finding very little in the way of prehistoric archeological material or at least no large, substantive sites. The most one expects to find is isolates or small (under 20 artifacts) sites. This paucity is created by the lack of permanent water sources in the form of springs or seeps located in the creosote biome. This area is beyond the limits of the underground aquifer and is not transected by escarpments that bring water to the surface in the form of springs or seeps.

Recent events conspired to allow the testing of this intuitive proposition on a large scale. In 1980, the Santini-Burton Land Sale Act (P.L. 95-586) was passed by Congress requiring the Las Vegas District of the Bureau of Land Management (BLM) to offer for public sale up to 700 acres of public lands located in the Las Vegas Valley every year for the next ten years. Of the sale receipts, 80 percent will be remitted to the U.S. Forest Service to purchase land surrounding Lake Tahoe while the remaining 20 percent of the receipts will be given to the City of Las Vegas and Clark County. In June and July of 1981, the first Santini-Burton Land Sale survey was conducted (Rafferty 1981a). It was followed by additional surveys in 1982 and 1983 (Rafferty 1982a, 1983).

The following is a brief review of the results of some major surveys conducted on the west side of the Las Vegas urban area (defined as any lands west of Rainbow Boulevard or U.S. 95) or lands more than a mile east of Boulder Highway (U.S. 93/95) and at least two miles northwest of the City of Henderson. These results pertain only to the valley areas dominated by creosote; areas within the valley near active or extinct springs and seeps or in the nearby mountains are not addressed.

Numerous surveys have been completed in the creosote biome prior to or contemporary with the initiation of the Santini-Burton surveys. Dozens of small surveys have been conducted by BLM personnel in the last two years, mostly for rights-of-way and other small-scale lands actions. In the last three years several large surveys (defined as being 50 acres or more in size) have also been conducted by BLM personnel on the west side of the valley. These surveys include three inventories totaling 320 acres for the City of Las Vegas's Angel Park (Rafferty 1980, 1981b, 1981c), a 75 acre land transfer application (Rafferty 1981d), a 320 acre material sale tract (Rafferty 1982b), an additional 120 acre material sale parcel (Rafferty 1981e), and several smaller land transfer applications totaling approximately 100 acres in size.

In the northeast portion of the valley, north of the boundaries of the aquifer, surveys include a 640 acre survey for the City of Las Vegas (Rafferty 1981e) and a 320 acre survey of a material sales site (Rafferty 1981f).

All of the Bureau initiated surveys resulted in negative findings and were conducted at an intensive (Class III) level of survey with linear transects spaced no farther than 10 meters apart being run over the entire acreage of the respective areas.

The University of Nevada, Las Vegas (UNLV) and the Nevada Department of Transportation (NDOT) have also conducted surveys in the creosote biome. A 241 acre housing tract was surveyed by UNLV just east of Rainbow Boulevard (Green 1983) while a 280 acre material pit survey was conducted by UNLV on the alluvial fan at the base of Frenchman Mountain (Ellis 1982). The latter inventory recorded the historic Frenchman's Mine complex just north of the actual survey area. NDOT also conducted two material pit surveys in the area immediately south of the Ellis survey; a 480 acre survey which also recorded Frenchman's Mine (Leavitt 1980) and a 560 acre proposed material pit just south of Leavitt's survey (Moore 1982). The last major NDOT survey was undertaken west of Rainbow Boulevard; a 320 acre material pit (Leavitt 1981). All of these surveys were negative in result and were conducted at an intensive (Class III) level of survey using transects spaced 10 meters or less apart which ensured coverage of the entire parcel.

The only archeological material, with the exception of Frenchman's Mine, recorded previously in these areas are four isolated artifacts within or near the Angel Park survey area, and a portion of the Old Spanish Trail that winds through the study area (Rafferty 1982b).

These inventories provide the data base for the intuitive hypothesis concerning the paucity of prehistoric archeological resources in the creosote biome. The three Santini-Burton surveys provided a good test of this hypothesis. It must be stated that none of these surveys was a statistically valid sample because the locations of land parcels were determined by political and economic criteria. However, all were located in the creosote biome and therefore provided a test for the hypothesis.

In 1981 and 1982, 760.36 acres and 641.25 acres respectively were surveyed prior to sale employing the Bureau of Land Management intensive (Class III) survey standards. The only parcels not surveyed were those where urban trash dumping or severe surface disturbance was observed (Rafferty 1981a, 1982a). In 1983, 667 acres of land were offered for sale to the public. Based on the results of the previous Santini-Burton surveys, a 25 percent sample survey of the offered parcels was undertaken. The land was divided into five acre parcels and given numbers from 1 to 132. From the first four sequentially numbered parcels (Nos. 1-4), one parcel was chosen using a random numbers table. Starting with that parcel, every fourth parcel in sequential order was chosen for on-the-ground survey. This is a systematic random sample technique (Mueller 1975). This strategy resulted in a 25 percent sample survey in which a total of 165 acres were inventoried at a Class III level of intensity (Rafferty 1983).

All three Santini-Burton surveys yielded negative results. From a total of 1,566.61 acres that were intensively surveyed, no cultural resources were recorded. The other large projects discussed above involved a total of 3,776 acres, and the numerous small surveys conducted by the BLM in

the creosote biome in the last 10 years involved 400 to 500 acres. Thus, more than 5,700 acres in the creosote biome have been surveyed with only a handful of prehistoric isolates being recorded. The historic sites--The Old Spanish Trail and Frenchman's Mine--represent commercial or industrial Anglo activities and as such, were not directly dependent on the environmental variables of the Las Vegas Valley for their location as prehistoric sites would have been.

Based on these results, the following procedures are recommended for implementation during future surveys in the creosote biome. First, an intensive records search should be conducted to determine if any cultural resources, prehistoric or historic, are located in or near the project area. Should the records search return negative results, the maximum sample intensity for any large project should be 25 percent to guard against the existence of unique or unrecorded historic or prehistoric sites possibly located in the areas under consideration. In addition, small projects of less than ten acres in size corresponding with any of the cadastral sections intensively examined by earlier Santini-Burton surveys should not be surveyed if the initial records search is negative. This approach will save time and money for the BLM thus permitting the allocation of scarce manpower and monetary resources to higher priority projects and expediting the processing of lands and minerals actions within the Las Vegas Valley.

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APPENDIX II: NATIONAL REGISTER PROPERTIES IN THE LAS VEGAS VALLEY

Brownstone Canyon Archeological District: Federal Register, Volume 47 (169), Tuesday, August 31, 1981.

Tule Springs Ranch: Federal Register, Volume 46(96), Tuesday, May 19, 1981.

Las Vegas Mormon Fort: Federal Register, Volume 44(26), Tuesday, February 6, 1979 (2-1-72).

Las Vegas Springs: Federal Register, Volume 44(26), Tuesday, February 6, 1979 (12-14-78).

Corn Creek Campsite: Federal Register, Volume 44(26), Tuesday, February 6, 1979 (3-4-75).

Mormon Well Spring: Federal Register, Volume 44(26), Tuesday, February 6, 1979 (12-24-74).

Sandstone Ranch: Federal Register, Volume 44(26), Tuesday, February 6, 1979 (4-2-76).

Sheep Mountain Range Archeological District: Federal Register, Volume 44(26), Tuesday, February 6, 1979 (12-31-74).

Kyle Ranch: Federal Register, Volume 44(26), Tuesday, February 6, 1979 (10-6-75).